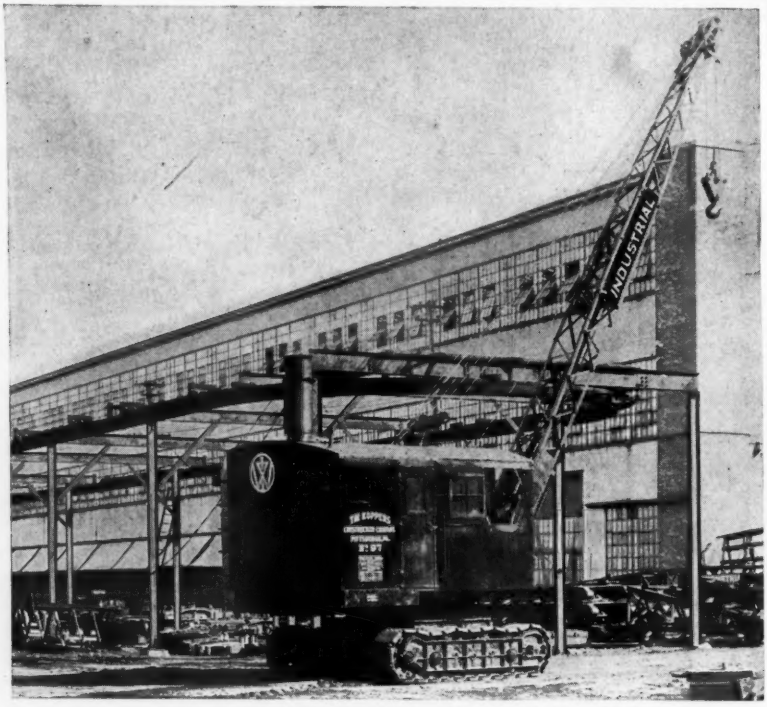
Pit and Quarry

SAND-GRAVEL-STONE
CEMENT-LIME-GYPSUM

May 1, 1926



Two Speed Outfit

WHEN handling light loads it is of advantage to be able to speed up operations without racing the engine and this is possible with the INDUSTRIAL crawler machine. One-speed machines either operate too fast for heavy work or too slow for light tasks. Not so with an INDUSTRIAL as the operator may shift into high or low gear at will. This makes it an all-purpose machine of great efficiency.

Similar to the two speed hoist is the two speed propelling of an INDUSTRIAL. For steep grades and soft ground the low gear is much more practical. But for level ground and speed, the high gear moves the DC from place to place with almost unbelievable quickness.

This two speed feature is just another one of the hundred reasons why INDUSTRIALS excel. Keep a look out for our next advertisement, we have a lot more to tell you.

Other products: Locomotive cranes, 5 to 200 tons capacity, freight cranes, pile drivers, clamshell buckets.

INDUSTRIAL WORKS · BAY CITY · MICHIGAN

Pit and Quarry

A Semi-Monthly Publication for Producers and Manufacturers of Sand, Gravel, Stone, Cement, Gypsum, Lime and Other Non-Metallic Minerals.

Subscription price $2.00 per year. Single copies 25c.

Vol. 12 CHICAGO, MAY 1, 1926 No. 3

FEATURE CONTENTS

Pass it on

President .....

Vice-Pres. .....

Secretary .....

Treasurer .....

Gen. Mgr. .....

Sales Mgr. .....

Traffic Mgr. .....

Engineer .....

Supt. .....

Foreman .....

Purch. Agent .....

COMPLETE SERVICE PUBLISHING CO.
Rand-McNally Bldg., Chicago, Ill.

Publishers of

PIT AND QUARRY and Pit and Quarry HANDBOOK

HARRY W. BAUMGARTNER
President

V. E. LARSEN
Vice-President

S. E. COLE, Eastern Representative
90 West Street, New York
Ph. Rector 4154

HAROLD W. MUNDAY
Editor

Associate Editors
E. D. ROBERTS
GEORGE B. MASSEY
F. A. WESTBROOK
G. H. EMANUEL

Pit and Quarry

Vol. 12 Chicago, Ill., May 1, 1926 No. 3

Ethics and Business

BUSINESS procedure has undergone a vital transition during the last quarter of a century. New economic standards and changed business methods have displaced the old doctrine of "Laissez faire" or "Let the buyer look out." From that period of treachery and suspicion we have passed into one in which the watchword is service. The very word has been used extensively in all capacities from corporate titles and letter heads to advertising catch words and bill board announcements. The idea of service has taken deep root in the nation's business psychology and has increased its strength with the nation's industrial growth. So universally has the word been accepted as an open sesame to the buyer's confidence that it is now looked upon with some degree of suspicion. It has been in so many instances merely a business expedient that it has lost some of the charm that originally was attached to it. Hence we may well be alert for a new trend in business psychology, an appeal to the confidence and faith of the public.

The importance of ethical elements and standards in business procedure cannot be overestimated. The word service is likely to be forced to provide for itself a sound backing in the word ethics. The key to business stability is general confidence which can be secured permanently only through prevalence of ethical principles. Business must establish an ideal far above the one which has motivated it in the past, when in many instances mere pecuniary reward satisfied it; when unscrupulous practices were explained on the ground that, "Business is business." Business is not a machine which is irresponsible; it is a man who carries moral obligations to those upon whose confidence he builds.

Sincerity in business practice is essential to a sound ethical structure. If the attitude which prevails in the organization is voiced in the remark, "Service talk will put it over," the members will be governed by that standard when they become the consumers. Such doctrines spread with amazing rapidity throughout the community creating a belief that the entire business world is founded on insincerity. In the mind of the buyer is firmly fixed the belief that there is reason to assume that he will be misled if possible, that he must challenge every statement regarding the commodity, that "good business" must be considered guilty until it proves itself innocent. Such a mental attitude on the part of the buyer when once established is difficult to combat. Service which is sincere, reliable and valuable counteracts the tendency to doubt all statements regarding the commodity and claims for its superiority. If the philosophy of service must not succumb to the greed for profits, the business man may take his place among world factors in the creation of a new social organization.

There is no doubt that this new ethical principle is gaining force in our business structure. New rules of conduct are slowly being accepted as essential to sound business practice. In advertising there is less exaggeration, less misrepresentation than formerly. "Truth in advertising" has become a motto among reputable and influential business organizations. Standardized prices are replacing the old cut throat methods and are establishing a merited and wholesome confidence in the mind of the buyer. The element of moral dependableness back of trade names and brands indicates the attitude of business organizations. They are as desirous of protecting the reputation of their trade marks as of defending their own good names.

The new note of ethics is also ap-

parent in all phases of production. It is the force which will increase the solidarity and efficiency of the business organization. The machine and the corporation have demonstrated what can be done in increased efficiency due to standardization and large scale production. It is the new principle of ethics which has functioned to promote cooperation and to reduce friction. Wherever this cooperation has been secured, there has followed a significant increase in profits. The manager of a generation ago would scarcely recognize the plant today with its scientific management, shop committees, workmen councils, open books of account and general cooperation principle. The management today leads the organization as a cooperative unit instead of driving it as a mechanical automaton.

The Lime Convention Plan

ANNOUNCEMENT has been made that the Eighth Annual Convention of the National Lime Association will be held at French Lick Springs, Indiana, from June 8th through the 11th. This brings to mind the fact that for the third consecutive year the convention plan of the lime manufacturers has included the selection of a gathering place where a maximum of rest and recreation may be combined with the actual work of the convention. In 1924, White Sulphur Springs in the beautiful hills of West Virginia was selected; in 1925, Briarcliff Manor in the famous Westchester County, New York, only a few miles from New York City, was chosen. Each of the three places offers all that can be desired in varied facilities for recreation, such as golf courses, tennis courts, riding stables and baseball diamonds.

The plan of the National Lime Association is fundamentally a part of a new idea in conventions, and one that is highly favored by those who are fortunate enough to attend. While the National Lime Association was not the first to break away from the old plan, it was among the first few and has had its effect upon other associations which have subsequently changed their plans. This policy of the lime association is to lengthen the convention period, to condense the actual business to be considered into as few sessions as possible, and to provide facilities for golf, tennis, riding, baseball, etc., so that those in attendance may enjoy a varied program of recreations between sessions. The social side of the convention serves a larger purpose than that of pleasure only. The spirit of comradeship which pervades the golf course or presides over the banquet group becomes the dominant force in the Association. It permeates the membership and functions throughout the year, holding the members in a bond of friendship and drawing them together again for an annual renewal of interests.

The advance reports of the coming lime convention indicate that the program will be devoted to intensive activity in every department. Only two outside speakers are included and their addresses will probably be on distribution and on the more extensive use of lime in construction. If the convention were held in a large city, the membership of the Association would probably be scattered; at French Lick, however, they will all be quartered under the roof of Tom Taggart's big French Lick Springs Hotel.

This improved convention plan provides greater facilities for conferences as well as for friendships and acquaintances. The hurry and confusion of the average city convention are entirely eliminated. The old plan of working by day and playing by night left a great many of those in attendance in need of a rest at the close. The improved plan is designed to leave everybody thoroughly rested at the finish. Usually a short morning session is held from ten until twelve or one. This is followed by group lnucheons or a large luncheon open to all. These luncheons may have a speaker on the program. The afternoon is given over to recreation for diversion as one desires. Tournaments in golf, tennis, quoits and baseball may be held to stimulate activity. For a four day convention one evening may be devoted to bridge and dancing, another to the banquet, and another to a short business session.

The convention plan of the National Lime Association is a wise one. We commend it to the other trade associations in the non-metallic industries. We also urge all lime manufacturers to attend the coming lime convention for the rest and for the pointers which are to be had from a genuine clearing house of ideas such as is planned for the convention at French Lick Springs.

Marketing a Variety of Lime Products

By F. A. Westbrook

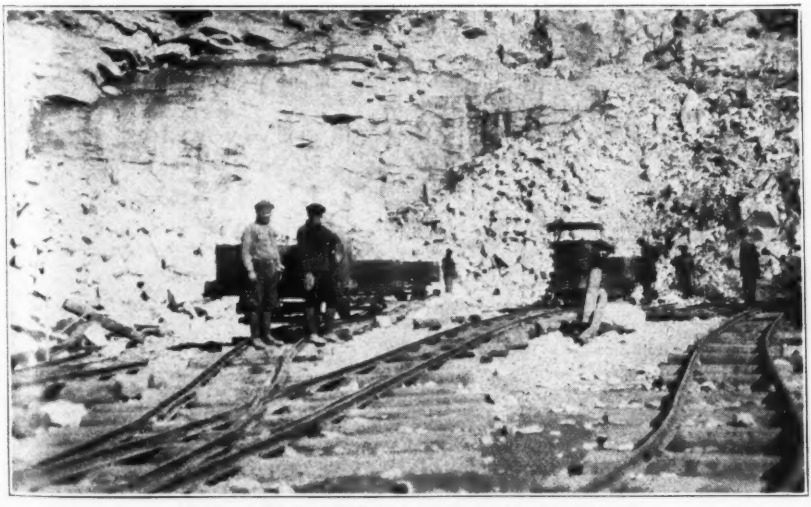
AT THE plant of Clifford L. Miller at West Stockbridge, Massachusetts, a rather unusual variety of lime products is manufactured. These include hydrated finishing lime, known by the trade name of Mellatone, dry mortars and artificial stone compositions known as McDermott's Boston Shim, Monarque Caenstone and Lime-stone cement, and Monarque dry mortar. In addition to these Miller's finishing lime and Monarque plastering lime which are brands of lump lime, are made at this plant, as well as stucco dash, chicken grit and agricultural ground limestone and hydrated lime.

This concern is most fortunate in having magnesia limestone in one of its quarries from which the finest grade of finishing lime can be made. This is the only one in operation east of the Ohio deposits, with the exception of one working in Rhode Island, and the result is that on account of the lower freight rates the company is in a very favorable position with respect to the New England and New York markets.

There are two quarries, the old one from which a high calcium limestone is obtained and a new working located nearby from which the magnesia or dolomitic limestone is obtained. Both of these quarries are connected with the plant by narrow gauge railroads on which two 3-ton Plymouth locomotives haul trains of dump cars made by the company.

Coal Hoist From Pit

There are eight upright kilns in



New Quarry Showing Tracks and Locomotive

Hoist Taking Waste From Kilns

all—three in one building and five in another adjacent building. They are fired with coal.

The stone is dumped in in the top from a series of tracks which fan out from the main track instead of the more usual arrangement having a single track extending along the tops of all the kilns. This is because of the topography of the land and the location of the quarries, with respect to the plant. The kilns were erected by Richard K. Meade of Baltimore, Maryland.

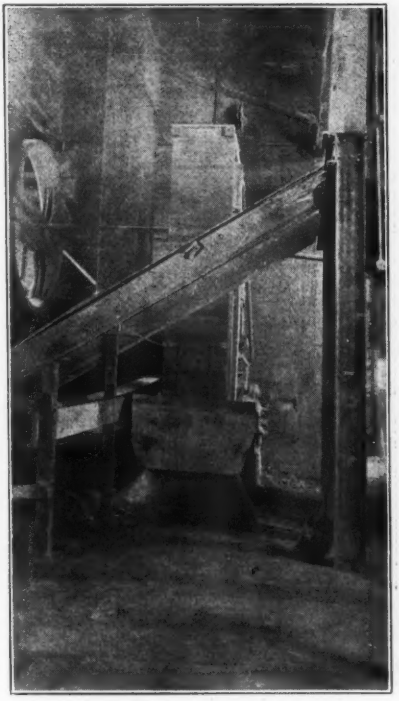
The method of handling the burned lime is unusual and ingenious. The material is drawn from the kilns into end dump cars, but instead of dumping it on to the floor for cooling, sorting and packing the cars are pulled up an incline and dicharged into a steel bin or hopper with a narrow outlet to a "picking table." This is shown in one of the illustrations. There is one for each kiln. The hoisting cable is Roebling wire rope and the steel for the dump cars and bins were supplied by the Brown Wales Company.

The advantages of these picking tables are numerous. In the first place it is a more positive method of sorting which is of particular importance in making the hydrated finishing lime where uniformity of quality is essential. As the bins are large enough to hold the full twenty-four hour output of their respective kilns a great deal of floor space is conserved.

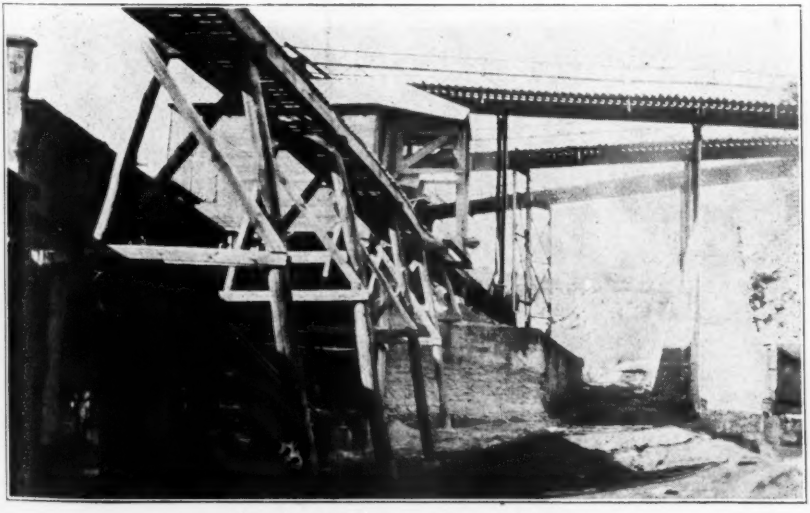
Furthermore it is much easier to load containers placed under the edge of the table than to lift the lime up from the floor by hand with a shovel to fill them. Weighing is done with Fairbanks scales.

Tracks From Coal Hoist to Storage at Kilns

The lime from the house containing three kilns is mostly from the high calcium quarry and is loaded into barrels as lump lime. The barrels are made in the cooperage shop and are transported to this building by first being elevated and then rolled by gravity along a run. Between this and the building where the five kilns are located is the crushing and pulverizing plant where agricultural lime, grit and stucco dash are made. Before entering into a discussion of this, however, it will be well to consider the processes carried on in making the hydrated lime. This is done close to the group of five kilns and the high grade magnesia lime is taken from the picking tables in steel wheel barrows purchased from the Berkshire Mill Supply Company of Pittsfield, Massachusetts, and deposited in an opening in the floor. It is then taken in an elevator to a Pennsylvania SX 3 crusher. After crushing the material is taken by an elevator to a bin whence it drops to a Raymond pulverizer and then to a Raymond feeder by means of which proper proportions of lime and water are measured out for the hydrating process. The hydration is accomplished in a Clyde lime hydrator. The hydrated lime is then passed through a Raymond blower and deposited in six tanks made by the New York Central Iron Works by means of a Link-Belt screw conveyor. The lime is taken from the storage tanks by another Link-Belt screw conveyor to the two baggers furnished by the Invincible Grain Cleaner Company. This is the Mellatone hydrated finishing lime which is put up in 50 pound paper bags made



Entrance in Floor to Elevator



Tracks Leading to Top of Kilns

Blower into Storage Tanks

by the Miller and Tompkins Company. A part of this same material is, however, used for making the dry mortars.

Now let us consider the crushing and pulverizing plant. The stone is first dropped into a number 6 Austin gyratory crusher at the top of the plant from the quarry cars. From this the stone drops to a "Neway" Sturtevant separator. The overs go to a Sturtevant vibrating screen and the throughs to a Link-Belt screw conveyor. The overs from the vibrating screens go to a Raymond pulverizer and the throughs into troughs to the same screw conveyor. Finally the pulverized stone goes to the screw conveyor which carries all of the material to storage bins, of which there are three, the largest holding 600 tons. However, all of the material is not pulverized, for the stucco dash and chicken grit are taken off at the proper stages in the separating or screening processes.

The agricultural lime is bagged in 100 pound Miller-Tomkins paper bags below the storage bins. Five car loads a day is not an unusual shipment in the spring of the year and frequently considerably larger quantities are shipped. The dry mortars are mixed in a Broughton mixer, furnished by Dunning and Baschert of Syracuse, New York. This is located in the building where the hydrating is carried on, as, among other materials, a good deal of pulverized lime stone and hydrated lime are used in these mixtures. There are Link-Belt screw conveyors from the respective storage bins of these two materials to the mixer. A Cyclone hair picker made by the Webster Manufacturing Company has also been installed for use in connection with the mixing of the dry mortar.

From the foregoing descriptions it

Incline From Bottom of Kiln Showing Storage Tank

Incline From Kiln to Picking Table

will be seen that the mechanical handling of material has been developed perhaps more than is ordinary in lime plants.

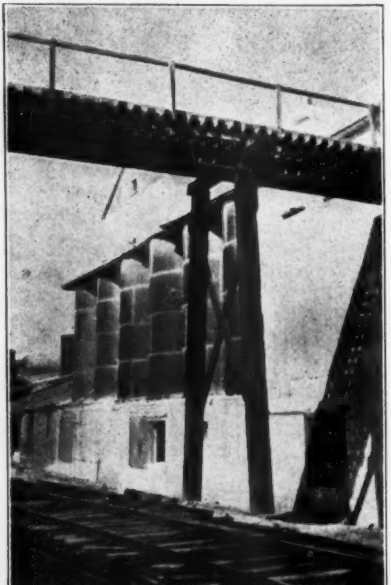
The old quarry where the high calcium stone is found is located very close to the plant. The new quarry where the magnesia stone used for hydrated finishing lime is obtained is about a quarter of a mile away. The tracks cross a valley but are kept at the proper elevation to avoid undue grades by being constructed on a wooden trestle. The space under this trestle has been filled in with waste stone. This is shown in one of the illustrations.

Drilling is accomplished with Sullivan jack hammers and the blasting with Atlas dynamite. The holes are made 14 feet deep, 6 feet back and 4 feet apart. The compressor was also obtained from the Sullivan Machinery Company.

The plant is fully electrified and there is considerable belting. The belts which are now being used are the "Commander," made by the B. F. Goodrich Company.

The description of this very interesting plant would not be complete without reference to the method of handling coal in the kilns. A pit has been made over which the coal cars

Trestle Leading to New Quarry



Lime Storage Tanks

are run and into which the coal is discharged. The coal is then taken up by a bucket elevator to a hopper from which small dump cars are loaded. These are run along a track above the firing floor of the kilns and are hauled by a Fordson locomotive. The coal is thus unloaded at various points convenient to the kiln.

One or more mixers for dry mortars will probably be added to the plant in the near future and it is expected that another hydrating unit will be installed adjacent to the group of three kilns to facilitate the hydrating of the lime produced at this point.

G. M. Ketcham Manufacturing Corp. (Building supplies.) Capital $20,000. 1,000 common, no par. L. S. and G. M. Ketcham, Jr., P. Mooney. (Atty., H. C. Smyth, Jr., 30 Broad St., Manhattan, N. Y.)

The Shreveport Concrete Products Co., Inc., Shreveport, La. Capital $38,000. G. A. Houseman, D. T. Clement, E. D. Chalin, officers.

Clean Cement Products, Schenectady, N. Y. Capital increased from $15,000 to $50,000.

Crushed Stone Companies Combine

The corporations heretofore known as the Texas Stone Products Company and the Chico Crushed Stone Company have been dissolved and reorganized as one corporation under the name of the Chico Stone Products Company of Dallas, Texas. This company succeeds to the business of the two dissolved corporations and assumes all contracts.

The management of the two companies has been identical for some time, and no change in the personnel of the management occurred. The merger was deemed expedient to simplify operations, and better serve the trade.

The quarries and crushing plants of the combined firm are equipped to produce 2,000 tons daily of hard, clean and carefully graded concrete aggregate and highway material.

Dean Hill Pump Improvements

Dean Hill double suction centrifugal pumps are now manufactured in sizes from one to 36 inches. Recent improvements and the important details of construction are pointed out in circular number 402 just issued by the manufacturers. Among the noteworthy features is the horizontally split case which allows the pump to operate without disturbing suction or discharge piping. The inclosed impeller is of hard cast bronze and the impeller rings are of the labyrinth type threaded on to the impeller.

The case wearing rings are also of the labyrinth type and are securely held in absolute alignment. The pump has extra deep stuffing boxes bronze glands and bronze lantern rings for water seal. There is ample space between the stuffing box and bearings for examination and renewal of packing. The bearing brackets are securely bolted and dowled to the pump casing.

The pumps has removable shaft sleeves of hard bronze which fully protect the shaft from wear and corrosion. The shaft is of special steel of large diameter turned and ground over the entire length. Bronze removable throat bushings act as a guide for the water entering the eye of the impeller. These pumps are built for motor, turbine, gasoline engine or belt drive.

A Study of Heat Losses in Lime Kilns

By Charles Longenecker

IT IS remarkable what few really noteworthy improvements have been made in late years in heating operations. The manufacturer of lime compares his vertical kiln with that of his forefathers and acknowledges no change in principle. He has a more refined process and has instituted improvements in various labor saving devices but his coal to lime ratio shows very little change. The lime manufacturer need not feel chagrined for neither can his contemporaries in other lines boast of any marked advance.

It is the intention here to discuss heat losses in vertical kilns, to point out the magnitude of these losses, and then show how those features which have reduced fuel losses in other heating operations are applicable to the lime kiln. In presenting these various features the idea is solely to acquaint engineers with the methods employed. The only way to determine their success is by trial.

In considering any innovation the economic side must be fully appraised for after all what most concerns the manufacturer is the cost per barrel of lime. With this in mind the cost of the equipment employed in the several processes will be given.

The heat expended in preheating the stone and effecting separation of the CO_2 will approximate 45 per cent for a high calcium stone.

The heat losses are:

1 Conduction and Radiation....15%
2 Heat in Stack Gases.....25%
3 Heat in Hot Lime..... 8%
4 Combustible in Ash..... 4%
5 To create draft..... 3%

The percentages covering the losses specified vary of course in different kilns and in varied methods of firing, but they are close enough to form a basis on which computations may be made. Using these percentages, expenditures will be converted to a B.T.U. basis per hundred pounds of coal burned with an assumed B.T.U. content per pound of coal of 13,000. The B.T.U. content then of 100 pounds of coal is 1,300,000.

Of these 1,300,000 B.T.U.s, 45 per cent or 585,000 is expended beneficially. If this amount of heat could be reduced it would be advantageous but the 772 B.T.U., necessary to decompose one pound of stone, cannot be lessened. To this must be added the heat required to preheat the stone and evaporate any surface moisture on the stone. There may be a reduction in the heat required to vaporize or evaporate the moisture. This can be accomplished by obtaining a decreased pressure in the kiln. It requires less heat to evaporate moisture if the pressure in the kiln is lowered. It is obvious that the less water charged in the kiln the less fuel need be burned. It is desirable of course in some kilns to have a percentage of steam in order that "recarbonization" may be avoided. Heat losses will be considered in order.

Conduction and Radiation

Per hundred pounds of coal this loss amounts to 195,000 B.T.U.s. The only means to prevent this loss has been the employment of some form of insulating material; either ashes or brick of porous nature. The fire brick forming the kiln lining must first of all resist the abrasion of the descending mass of stone. A fire brick to resist abrasion must be of dense structure. This structure unfortunately is ideal for the conduction of heat and will transfer heat to the steel shell more rapidly than a brick of porous body. The trend in engineering today is to provide air cooling next the shell and thus prevent the conduction of heat and by cooling the inner wall reduce radiation. This is the practice in the modern boiler setting. This same practice could be adopted in lime kilns provided means are employed for moving the air through the channels. Naturally the air will be heated and if any economic advantage is to be derived the hot air should be used to effect a saving. The method for utilizing this air will be discussed later under another heading. It is apparent that such an innovation will necessitate a departure from present day practice but it is being adopted in many other types of furnaces and gives material fuel reductions. The air channels pass between the fire brick lining and a course of insulating brick next the shell. It has been found the fire brick lining can be reduced in boiler settings but it is questionable if this would hold in lime kilns as the conditions are different. This feature

effects a reduction in heat loss due to conduction and radiation averaging say 25 per cent. Whether this is applicable to lime kilns must be determined. Both the operating and economic effects must be known.

Heat in Stack Gases

This is the largest loss and for 100 pounds of coal amounts to 325,000 B.T.U. Probably no loss has been so fully analyzed as this one. It can be attacked from two directions. First—to cut down the excess air and reduce the quantity of gases. Second—to utilize the heat in the gases by returning this heat to the kiln. Both of these methods of approach will be given attention. The excess air in the hand fired kiln may run from 50 per cent to 100 per cent depending on the attention and skill of the fireman. Excess air must be heated to the temperature required in the hottest zone of the kiln. This large volume of gases augmented by the CO_2 from the stone passes into the tempering and preheating zone and gives up some heat to the colder stone. If all the heat could be given up and the gases pass out at atmospheric temperature there would be no loss but such is not the case. The gases will pass out at a temperature higher than atmospheric and the loss will be considerable. The increase in volume of gases too may decrease their travel through the kiln and the velocity will be less than under correct conditions. The rate of heat transfer from a gas to another body is greater the higher the velocity so that any slowing down of velocity results in heat loss. Therefore it is desirable that the per cent of excess air be kept constant and at that quantity found to give the best results. With hand fired furnaces it is exceedingly hard to keep conditions constant. There is also danger of going to the other extreme and not securing complete combustion and in this way more fuel may be wasted.

The Eldred process returns the waste gases and this process is, as is well known, found in use on many kilns. Another way, not new by any means, is to pass the waste gases through an air heater and by heating the air make it return a large portion of the energy of the stack gases. This method is finding wider application every day. It is now very common on boilers and is being extended to cement kilns and many types of heating furnaces. Its application to lime kilns is suggested.

In many kilns the gases from the stack have an average temperature of 500 degrees F. This temperature corresponds to that of the gases from boilers. Per pound of coal burned and an air excess of 50 per cent the quantity of waste gases will approximate 17 pounds. From a kiln making 12 tons of lime in 24 hours, the quantity of stack gases per hour will be 190,000 cubic feet per hour as an average, at 500 degrees F. temperature. These gases when passes through an air preheater would raise 2100 cubic feet per minute of air to a temperature of 375 degrees F. A fan for drawing the gases through the preheater would require a motor of 25 h.p. The air must be forced through the preheater. This would be done by a second fan driven by a 7½ h.p. motor. Under the heading "Conduction and Losses" mention was made of lessening the losses by running air channels near the kiln shell. The air could be drawn through these channels by the same fan that forces air through the air preheater. The heated air on leaving the preheater would pass to the fire box and there burn the coal. The saving is not only in the sensible heat in the air returned but a further saving is obtained in a more efficient burning of the coal. The combustible in the ash is less and more perfect combustion results. Also conditions are stabilized and the irregularities are overcome. The cost of the air heater and fans with motors would be approximately $2700. This cost may be prohibitive to most lime manufacturers but it shows what can be done in preheating air and the cost.

Loss From Heat In Hot Lime

A loss of 104,000 B.T.U.s results from the heat carried away in the product of the kiln. This loss can and is being reduced by circulating air through passages in the walls of the "lime cooler." Here again the fan, previously mentioned, to be used in forcing air through the air preheater, could be applied to draw air through the passages in the cooling hopper. The suggestion is made that a change in the design, with the arrangement cited, may give greater efficiency in cooling.

Loss Due To Combustible In Ash

This loss is given as 4 per cent or 52,000 B.T.U. per 100 pounds of coal

burned. These figures are in all probability much lower than is found in practice. It is very probable that a loss of 10 per cent to 15 per cent is more nearly correct. If hand-firing is to prevail the only way to reduce the loss is by an improvement in the "personal factor," and, in all frankness, it must be admitted this is a difficult remedy. There is one point which should be mentioned in this connection and that is the quality of coal burned. The writer has frequently found cases where a change in coal has produced very appreciable savings. The purchase of a cheap coal, simply because it is cheap, is most frequently a very expensive deal. As a rule the higher grades of coal of low ash and sulphur and high B.T.U. content give the most satisfactory results. This is not only true of the lime industry but obtains in other industries as well. In certain locations it does not apply but this is generally because a coal is near at hand of acceptable quality and at a low freight rate.

Loss to Create Draft

This loss is given as 3 per cent and amounts to 39,000 B.T.U. An induced fan will create a suction in the kiln and this small loss will be made smaller. It cannot be eliminated. It is true in all manufacturing processes that to secure uniform results there must be uniform conditions in the apparatus whether it be a lime kiln, a boiler or a turbine. Therefore progress will be along this line. The lime manufacturer knows that his "over burned" and "under burned" lime is due to changes in the kiln firing. If the amount of heat passing into the kiln is constant and the flow of air is unvarying he will have a uniform product.

Kilns have been fired by hand on grates, by wood, by producer gas and in rotary kilns by powdered coal. There has been a steady advance in both the equipment for powdered coal firing and in its application. The writer believes it feasible to fire lime kilns of the vertical type with powdered coal. The change in kiln construction would be confined only to the fire box. There may be an insurmountable obstacle in the effect of the powdered coal ash or the quality of lime produced but this would not apply in all cases. The coal consumption of a kiln producing 12 tons of lime in 24 hours is about 375 pounds of coal per hour. One powdered coal mill of the "unit" type could supply coal to two or three kilns. The cost of equipment consisting of mill, motor and hopper would amount to about $4,000 and this equipment would furnish coal to three kilns. This would mean uniform conditions in the kiln and a reduction in coal handling cost. The burning of powdered coal in vertical kilns would not have been suggested two or three years ago but due to improvements in methods of burning this fuel and a more extended knowledge of the construction of combustion chambers it appears to have possibilities. Whether the economic condition would warrant such a change the manufacturers themselves can determine.

If any marked changes in lime manufacture are to be made they must be radical or along lines which will reduce the items here discussed. This statement applies only, of course, to question of fuel.

New Flory Hoist

A new Flory hoist has been placed on the market in two sizes, 10 h.p. and 15 h.p. Both these machines are overpowered the 10 h.p. which is designed for a load of 1,500 pounds single line at a speed of 160 feet per minute is equipped with a Continental P. 11 motor; the 15 h.p. with a capacity of 2,500 pounds line pull at 200 feet per minute has a Continental P. 20 motor. The over power insures long life and dependable load capacities at all times.

The drums of the hoist are bronze bushed at the ends where they run loose on the drum shafts. They are fitted with a heavy duty cone friction. Each drum is equipped with a shrouded rachet and forged steel prawl. The rachet is bolted to the drum flange and is easily replaced in case of accident.

The main gearing is protected by heavy wrought iron bands over the face of the teeth. The motor gearing is protected over the entire face and the operator's side by a sheet steel casing. The main gears are semi-steel with machine cut spur teeth.

All the other attractive details of Flory design are incorporated in the machines such as asbestos frictions and brakes convertible bed plates, non-heating friction nut, machine fitted bearings and caps, machine ground shafts Alemite lubrication, etc.

A New Method of Manufacturing Hydrated Lime

LETTERS of patent were granted to Charles I. Chubbuck, of San Francisco, California, April 3, 1926, for a new method of manufacturing hydrated lime. The method consists of slaking quick lime in an excess of water to a flowing putty, removing the major portion of the water before the slaking operation is completed, then completing the job with the remaining water and utilizing the heat generated by the last slaking operation to evaporate excess water.

Mr. Chubbuck's application for a patent which was filed February 28, 1924, gives the following description of his process:

"This invention relates to a method of manufacturing a dry hydrated lime; the object being to obtain a lime which will produce a smooth, adhesive, plastic putty or mortar, comparable, if not superior, to the putty or mortar produced directly from quick lime when slaked in one operation.

"Practically all hydrated lime sold on the market at the present time is manufactured by the following method with slight variations:

(1) The lump quick lime is ground to a fairly uniform small size.

(2) The powder or grains resulting therefrom are thoroughly mixed with sufficient water to slake the lime into a fine dry powder.

(3) The powder is then screened and bagged, and as such is ready for the market.

"With limes having a high calcium content it takes about 55 pounds of water to slake 100 pounds of lime to a dry powder.

"With lime containing magnesium it takes about 30 pounds of water to slake 100 pounds of lime to a dry powder.

"When lime is hydrated in this manner a great deal of heat is generated; the temperature usually ranging from 300° F. to 900° F. This high temperature produced apparently changes the physical characteristics of the lime as putty or mortar produced therefrom is inferior to putty or mortar produced directly from quick lime in one operation; that is, lime produced by the above mentioned process loses a certain amount of its plastic and adhesive qualities, and furthermore, is more or less granular in formation.

"The purpose of the present invention is to produce a dry lime which when made into a putty or mortar will retain all of the good or desirable qualities of putty or mortar produced directly from quick lime in one operation; this being accomplished by hydrating the lime in an abundance of water and by maintaining low temperatures during the slaking or hydrating operation. The method of producing the lime is substantially as follows:

(1) First slake either lump or crushed quick lime by hand or in a slaking machine and produce a flowing putty by adding an excess of water; the putty containing from 50 to 90 per cent of water, depending upon the character of the lime, care being at the same time taken to maintain such a water content that the temperature will not materially exceed the temperature of boiling water maintained under atmospheric pressure, to-wit, approximately 212° F.

(2) The flowing putty is then immediately run through a screen or classifier to remove any impurities contained.

(3) The hot putty is then delivered to a continuous or batch filter of any suitable character, which removes most of the excess water, thereby producing a stiff paste of lime putty containing from 25 to 40 per cent water.

(4) The water removed by the filter is pumped back to the slaking machine and as such may be used over and over again.

(5) The stiff lime putty is next conveyed to a bin where hydration is completed. The heat produced in the bin during the remaining period of the slaking or hydration operation will evaporate the remaining water, thus producing a dry hydrated lime. With some limes, however, it will be necessary to add a small amount of finely ground quick lime to increase the temperature sufficiently to drive off the water, but where this is not desirable drying may be resorted to by applying artificial heat. The lime thus produced retains all the desirable qualities of lime putty obtained by slaking quick lime in one operation as it is both smooth, adhesive and plastic."

Aberdeen Sand & Gravel Co., Aberdeen, S. D. Capital $25,000. Incorporators: C. H. Trude, V. Johnson, T. J. Heneges.

A New Lime and Cement Plant for New England States

THE lime unit of the New England Portland Cement and Lime Co. at Thomaston and Rockland, Maine, will go into production not later than July, 1926. The plant is entirely new, and modern throughout. Both plant-layout and equipment closely follow the lines of the latest conservative thought as to the best practices applicable to lime manufacture in all its phases. While the plant is thoroughly modern, the company has carefully avoided in its plans and construction, such things as might be classed as purely experimental. It has adhered carefully to such improvements as are generally recognized in the industry as being highly desirable for efficiency in manufacturing a quality product, and are often impossible to obtain in any other than a complete new plant.

The plant when complete will include a thoroughly modern cement plant with an initial capacity of 3,000 barrels of Portland Cement a day together with a lime unit, the first section of which will include four Schaffer semi-automatic shaft kilns with an annual capacity of 500,000 barrels of burned lump lime per year. The first two of these kilns are being completed in time for operation in July with the other two to follow immediately.

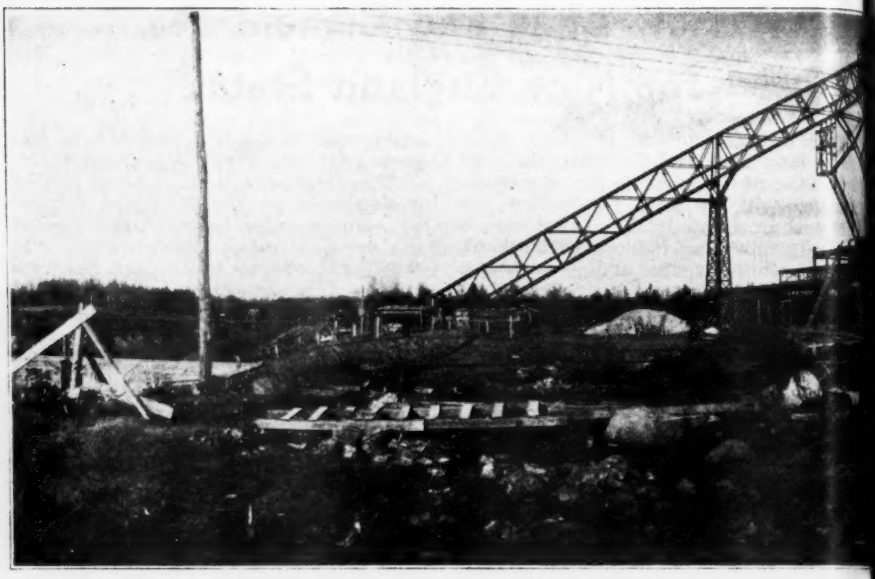
The mineral deposit from which both lime and cement will be made consists of some 500,000,000 cubic feet of limestone suitable for the manufacture of Portland Cement and available for open quarry methods of recovery, together with some 650,000,000 cubic feet of stone underground particularly adapted to recovery by mining methods. All of this stone is suitable for cement manufacture and has been proven both as to quantity and character by diamond drill cores and laboratory analyses of a most extensive character, requiring a large crew of men for over a year and a half constantly engaged in the work. There is a further quantity of available mineral which undoubtedly exists but has not been core drilled, and altogether this tremendous supply of limerock of the cement-making character furnishes a sound mineral background for any development that could possibly be expected for two hundred years or more.

This limestone is in what is known geologically as the Rockland formation and in referring to it the United States Geological Survey says, "It may be borne in mind that nowhere on this (the Atlantic) coast south of Rockland do pure low magnesia limestones occur near the seaboard." This company's properties are directly on the seaboard and being approximately 1000 acres in extent cover all of the known or probable limestone area in the formation that has not previously been operated.

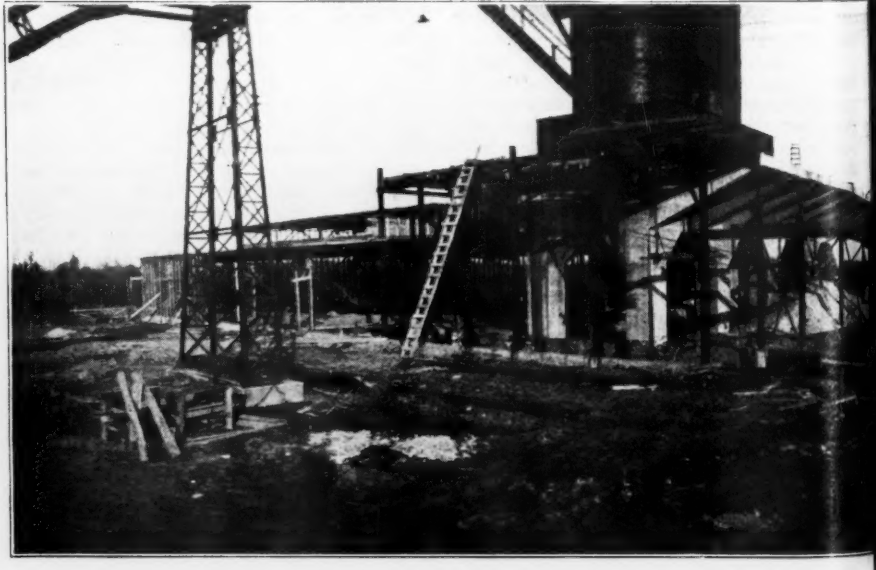
The Rockland limestone is well and most favorably known in the lime industry, that part of it which has previously been known to exist having been worked in the past for approximately 125 years. The portion on which the New England Portland Cement and Lime Co. is beginning to operate was not positively known to exist until explored by core drills. This exploration has shown it to be of such great extent, high quality and advantageous position in the earth from a recovery point of view as to assure its future as a factor both in the lime and cement industry to a degree not before ever suspected.

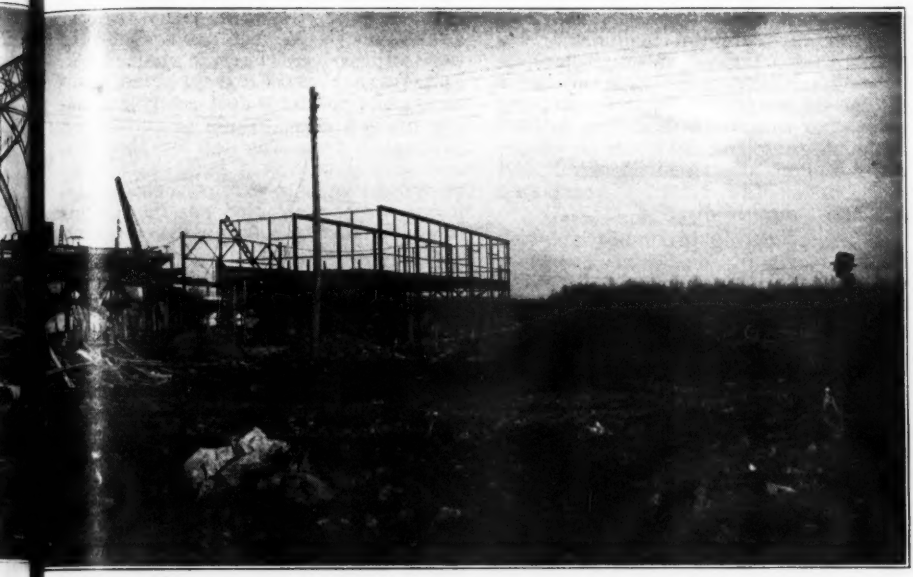
There are unlimited quantities of marine clay on and directly adjacent to the rock deposit. The company owns over twenty acres of land on the Rockland waterfront and the close proximity to the supply of raw gypsum from Canadian sources by water shipment, as well as tidewater fuel supplies, makes an ideal situation from a manufacturing point of view, and, when this is added to the further advantages of deep water (25 feet at low water) distribution directly from the plant, as well as rail distribution equally near at hand, the result is a combination of favorable circumstances that should assure the success of the company's operations from the start.

Included in the previously described mineral deposit is a large virgin deposit of high calcium limestone, suitable for the manufacture of the high quality of finishing lime that in the past has made Rockland justly famous. The value of this high grade

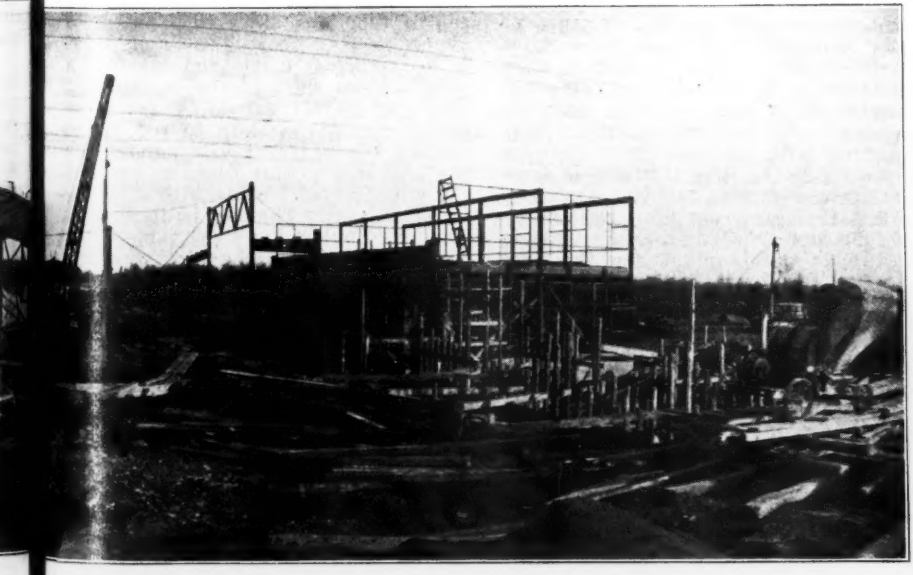


Two views of a recent date showing the progress on the lime unit bei… built by the New England Portland Cement and Lime Company at Thomast… and Rockland, Maine. Construction is progressing rapidly and the lime u… will be in operation not later than July of this year. The complete plans i… clude the building of a thoroughly modern cement plant with an initial c…





acity of 3,000 barrels of cement per day. The first section of the lime unit ncludes four Schaffer semi-automatic shaft kilns with an annual capacity of 00,000 barrels per year. The first two of these kilns will be completed in me for operation in July while the other two will be installed immediately fter the first two.



Rockland finishing lime in the lime markets is such as to justify the company in diverting to its manufacture a certain portion of selected stone to the making of selected finishing lime. Engineers employed by the company also state that with this modern lime plant, high grade lime can be manufactured at a very much lower cost than under the existing antiquated operation in this district.

While operating in connection with the cement unit, on which construction will be started by the time the lime plant is completed, it is practical to so carefully select the highest grade of finishing limerock as to assure the production of only the very best of finishing lime. It is the company's purpose to so operate.

The kilns are of the Schaffer semi-automatic shaft type with an outside diameter of 17 feet 3 inches and a height from firing floor to the top of the charging chamber of 53 feet. This allows for a sufficient large preheating chamber to supply the kiln with plenty of stone over a considerable period of time and permit of the utilization of a very large percentage of heat that is often lost in kilns with shorter shafts.

Each kiln has four furnaces fired by automatic stokers of a special design developed by a long series of experiments and now operating successfully in other kilns. This permits largely the elimination of the human element in haphazard firing and particularly assures the maintenance of lime burning conditions throughout the night shift which is often so hard to obtain in hand-fired kilns. The extraordinarily large cooling chamber characteristic of the Schaffer kilns together with their charging methods with which the lime industry is familiar, are a part of this installation.

A late improvement on the charging mechanism of the Schaffer kiln is installed in this plant for the first time, in the form of counter-balanced doors in the top of the kiln, which drop when the stone is dumped on them and automatically close as the stone slides down into the kiln. This breaks the fall of the stone, and improves its distribution, as well as insuring a closed top on the kilns at all times, and providing for the proper functioning of the kiln stacks to maintain a constant draft of whatever degree is required for best burning conditions.

To resist abrasion inside the charging chamber, and reduce the shock of falling stone, the kilns are lined for a distance of 22 feet down from the top with a hard burned shale brick, and further protected by steel railroad rails spaced 8 feet apart extending up and down inside of the lining, supported from the top of the kiln, and spaced with cast iron spacers between the rails to assure their retaining a permanent fixed position. This is a new feature of kiln development.

The supply of fuel to the kilns is handled in a manner that in some of its features is, we believe, new to the lime industry. Crushed coal is dumped from hopper-bottom cars through a track hopper and crushed in the usual way then conveyed by an incline scraper conveyor to a conical pile holding 2,500 tons stored in the open adjacent to the quarry and kilns.

A standard type of reclaiming machinery in the form of a belt conveyor operating through a tunnel extending under the coal pile, carries the coal into a chute which discharges above the quarry floor about 45 feet below the general plant yard level. This chute empties into a hopper from which the ordinary quarry cars are loaded with coal and moved over the quarry tracks and up the incline to the top of the kilns in a manner exactly similar to, and on the same transportation system as, stone used to charge the kilns.

Between number 1 and number 2 kiln a steel bunker extending from the top of the kilns down to a height of about 15 feet above the firing floor, is constructed using the steel kiln sides as two sides of the bunker and with flat plates extending from the center line of one kiln to the center line of the adjacent kiln tangent to the kiln shells, thus forming between the kilns, a coal bunker with a capacity of 75 tons. The coal is discharged into this bunker from the same track as is used in stone charging, through iron doors on the top of the bunker between the kilns. Danger of combustion in this bunker is prevented by insulation and yet it is expected that the temperature will be sufficiently high to prevent the freezing of wet coal in severe weather.

From the coal bunker, the stokers are fed by weigh-larries, running on tracks above the stoker feed hoppers. The fuel consumed will be measured by volume in these weigh-larries. The lime when discharged from the coolers will be sorted by hand as this is be-

lieved by the company to be the only positive way of assuring proper selection. The most modern methods of barrel handling will be used and a Schaffer hydrate plant of the latest type will form a part of the plant.

The quarry development will include both open quarry operations and underground mining, a combination of the two being most suitable for local conditions. The quarry development at the present time has proceeded to a point where a vertical face of high-grade stone, 35 feet high and approximately 1,000 feet long, is exposed ready to be shot down and transported to the kilns.

These properties have been very favorably reported on by Richard L. Humphrey, Charles P. Berkey, James F. Kemp, Schaffer Engineering Company, Richard K. Meade, and Cowham Engineering Company, John L. Senior, president. The officers are as follows: Alfred S. Black, president, Walter E. Bowe, treasurer; H. A. Mintz, secretary, and W. R. Phillips, vice-president and general manager, in charge of active operations, supported by a Board of Directors composed of well known New England business men.

New Haiss Booklet

Loader efficiency is treated extensively in the new booklet published by the manufacturers of the Haiss loaders and precision measuring hopper. The booklet entitled, "Feeding the Paver," gives the paving contractor a wealth of information on advance storage of materials. It is primarily an argument for this system as against hauling by multi-batch trucks from a hopper plant at a railroad siding but there is much else in the booklet which will be of interest to those not concerned directly with paving.

Quarry and pit operators will be interested in the distinctive features of the Haiss creeper loaders which are treated here. It is claimed these machines dig, feed the material toward the buckets and crowd into the pile. The slow speed crowding motion is a positive worm drive which can be thrown in or out of mesh to keep the machine up against the pile. The self feeding device consists of inclined paddle blades which exert a conveyor action and also pick up the loosened material.

The buckets are pressed from ¼-inch steel plate in one seamless piece and are ribbed and braced for resisting service. Toothed edged plates reinforce the lip and dig effectively in stone as well as in sand and gravel. A 37 h.p. Waukesha motor drives the triple chain to the enclosed transmission, which houses all change gears and clutches.

This booklet also discusses the precision hopper but the subject is covered more fully in a new pamphlet just published entitled "Forge That Link Strong."

Pennsylvania Pumps

The high efficiency, reliability and convenience of the modern centrifugal pump has created a demand for pumps of this type to operate against higher pressures than is practicable with single stage centrifugal pumps.

Pennsylvania type OMS multi-stage centrifugal pumps are now available for pressures up to approximately 500 to 600 pounds per square inch, and suitable for almost any service.

Pennsylvania pumps combine high technical skill, years of exhaustive study, materials of the best quality, first-class workmanship, sturdiness and accessibility. The simplicity of design and minimum number of parts subject to wear are at once apparent.

Type OMS centrifugal pumps are available with as many as six stages in a single casing. Where a greater number of stages is necessary to meet the required conditions, two casings are offered, each of which may contain as many as six stages. The two casings are then arranged to operate in series so that half the total pressure is generated by the group of impellers in the first of low pressure casing, the final pressure being generated in the second casing.

The number of stages required for a given set of conditions is dependent on the speed of the driving element.

In theory, there would be no limit to the number of stages which can be incorporated in a single casing. Practical considerations, however, usually limit the number to six, thus keeping the span of bearings and size of shaft within safe, reasonable limits.

These pumps are suitable for direct connection through flexible coupling to steam turbine or electric motor, or they can be arranged for belt drive.

Concerning Quarry Blasting

By A. S. Deringer

SOME time ago a man who is interested in quarry blasting called on me, and wanted to know if I ever had experience with shooting black powder and dynamite combined. I referred him to a recent article I had written for Pit and Quarry, and told him that would give him the information he desired. He then wanted to know just how it was done. I informed him just how we used it in the particular shot referred to in the article, but cautioned him not to try precisely the same method in any other quarry, until he had fully analyzed conditions, and was sure that he had his proportions right and distributed properly, or his plans would be defeated.

I stated in that article that the method of shooting referred to, cannot be recommended for all quarries. In order to use the method of shooting referred to, or any other method it is necessary, or at least it should be, that a careful survey be made of the mass to be dislodged, and the spacing and location of the drill holes taken into consideration, in order to determine the amount of burden to be moved, and the fragmentation desired. Then formulate a table that will make it practical to distribute the explosive, in such a manner, that the entire burden will have force exerted against it, according to the condition, and tenacity of any particular portion of the burden.

It is pretty much a universal practice in quarry blasting to use the same amount of explosives per hole, in precisely the same position in each hole.

Now if your doctor prescribed the same amount of the same kind of medicine for you, to be taken at the same time, for all of your various ills, you would soon come to the conclusion that he was giving you the real elixir of life, or that he was a common quack. Now, we seldom, if ever, find in a quarry, that the burden to be dislodged is identical each time we go to shoot it, yet, many of us, hold to some rule or formula, that gave us pretty fair results, the last time we shot it, that we will adhere to the same formula, this time, and possibly regret, that we did not try some other method, when we find that our shot was a fizzle.

We sometimes hear quarry operators blame a particular grade or make of explosive, or they place the blame for unsatisfactory and costly shooting onto the man in charge of the blasting, when in reality the blame rests with them, unless they have delegated to the blaster, the supervision of the drilling.

I care not how much, or what grade of explosive you use, or how you load your holes, if your drilling is not done correctly you cannot hope to get satisfactory results.

It matters not the kind or quality of explosives used, all of it has its limitations, unless used without regard to cost or consequences, and when you overtax or go beyond these limitations you cannot hope to obtain satisfactory results.

The majority of quarry operators have passed from the small drill hole method, to the large hole or well drill method. This change has enabled them to decrease their drilling cost by increasing the burden, and getting a greater tonnage of stone per foot of drill hole. This method of drilling has led many operators to increase the burden to the extent that they have jeopardized the results they hoped to obtain. In reality they have possibly decreased their drilling costs, but increased their operating cost and reduced their output. I have tried to make it plain on previous occasions, that the drilling and blasting in every quarry operation were the two most important in the procuring of the raw material.

It will not be surprising if within the next score of years, possibly before another decade rolls around, that those of us still interested in the quarry industries, will have witnessed the passing of the well drill for quarry drilling, and in its stead a lighter, more portable, and faster drilling machine, that will permit of closer and more economical drilling, that will make it possible to drill up the burden better and permit of better fragmentation, especially in the quarries where the formation is dense and massive.

Within the course of this same period I also look for an invention in the explosive line that will be more economical than the present explosive and will permit of filling the drill hole or nearly so, thus exerting force against every square inch of burden.

Some German Tests and Results With High Grade Cements

From the Annual Report of the German Concrete Association*

1. High Grade Portland Cements.

From the replies to a round-robin questionnaire to the membership of the German Concrete Association in session in Berlin, March 4-6, 1926, the results so far obtained in the use of high grade cements have been correlated. The results of 33 construction firms with 24 different brands of high grade portland cement were made public. From these data the following current tendencies could be indicated, and they represent the conditions for the use of high grade portland cements:

1. Not all the high grade portland cements on the market at present are equally good. Even in the case of one and the same brand irregularities frequently occur. It is, therefore, advisable to make complete standard tests on every car of cement (setting, constancy of volume, fineness, strength), or, in case the equipment for testing is not available, they should be made by a commercial testing laboratory.

Note should be made of the fact that in carrying out strength tests on high grade cements the amount of water to be added is frequently different from that for ordinary portland cement. The ferro-concrete specifications of the German Committee for Ferro-Concrete, September, 1925, in this connection state in §5, footnote:

"For high grade cements the amount of water to be added cannot be determined according to the specifications for standard mortar. Until standards for high grade cements are issued, it is recommended to use 8 per cent of the weight of the dry mixture."

2. Standard tests are particularly necessary if the high grade cement has been stored for any length of time at the site of the job before it is used. The influence of storage period on the properties of high grade cement has not yet been fully cleared up. From the results communicated it appears that with some cements a long period of storage results in a loss of the high grade properties. It is therefore noted that high grade cements like all other cements should be stored protected from moisture and the weather. In case this is not done no blame can be placed on the quality of the cement if the physical properties show deterioration after a long storage period.

3. Besides the standard tests, at least in the case of larger structures, tests with samples of concrete made from high grade cement are strictly advisable in order to determine the proper method of utilizing the cement It is not immaterial whether the cement is mixed in cool and moist or hot and sunny weather. In these tests especial attention is to be placed on the proper selection and size of the gravel and on the correct determination of the amount of water to be added, as high grade cements are very sensitive with respect to the amount of water added. The test cube will give excellent indications of what a high grade cement will produce. In concrete bodies of large size and high requirements it is advisable also to measure the rise in temperature of the concrete on setting and hardening. It should also be noted that according to the ferro-concrete specifications of September, 1925, the building department inspectors in cool and in freezing weather in exceptional cases are empowered to make the decisions on the removal of forms dependent on the results of strength tests on test beams.

4. In order to avoid substitution or mistakes, strict care is to be taken that high grade cements can be easily distinguished by the character of the packages. (Compare Ferro-Concrete Specifications of the German Committee for Ferro-Concrete, September, 1925, page 5, section 1.)

It is proposed that the association itself carry out some tests with high grade cements. In reply to a questionnaire 51 member firms have so far indicated their willingness to share in the cost of these tests. The firm of Huser and Company of Obercassel, Siegkreis has indicated its willingness to cooperate by making

*Translated by A. P. Sachs, Technical Director, Universal Trade Press Syndicate, exclusively for Pit and Quarry.

laboratory space available free of charge.

2. Aluminate Cements.

As was mentioned in the last annual report, concrete test pieces made of French fused cement (ciment fondu) and coarse Rhine sand in the ratio of 1:6 were subjected on July 18, 1924, after 3 days' aging to the action of acid solutions, salt solutions and oil, in order to determine the resistivity of fused cement concrete to such liquids. The first investigation of these pieces was made on January 21, 1925, that is one-half year after beginning the test. The results were as follows:

The fused cement pieces in rape-seed oil and linseed oil were altered to a mass which lay in lumps on the bottom of the glass vessels and was of a buttery consistency throughout the mass. The concrete was thus completely decomposed by rape-seed oil and linseed oil in the course of half a year; the decomposition phenomena were even worse in the rape-seed oil than in the linseed oil. These tests were not continued.

In the case of 5 per cent sulfuric acid solution, the fused cement concrete was strongly attacked and soft at the surface and to a depth of ½ cm. (⅛ inch); in the case of 5 per cent acetic acid solution and 5 per cent lactic acid solution the effects seemed to have extended further into the interior of the test pieces.

Gravel which had been set free by the solvent action lay at the bottom of the containers. The action was relatively strongest in the case of the lactic acid and relatively weakest in the case of the sulfuric acid. After half a year the fused cement concrete test pieces were in a condition which indicates that fused cement concrete is not resistant to such strong acids. Nevertheless the acid solutions were renewed and the concrete test pieces were again immersed.

In 5 per cent chlorine water the surface of the fused cement concrete test pieces was slightly etched, but only so slightly that there is no question of any real attacking action. The concrete remained hard and strong. Similar results were obtained with 25 per cent sodium sulfate solution. The solutions were renewed and the concrete test pieces immersed again.

In the case of the fused cement concrete test pieces subjeced to the action of 25 per cent magnesium sulfate solution, 25 per cent magnesium chloride solution, 25 per cent ammonium chloride solution, 25 per cent sugar solution, gypsum water, 10 per cent ammonia water, 5 per cent ferrous sulfate solution, petroleum, gasoline and glycerin,, no etching or destructive effects could be detected on the surface of the concrete; the concrete was exactly as it was when it was first subjected to the test. The liquids were replaced and the concrete test pieces were immersed again.

At the second inspection on December 18, 1925, that is 1½ years after the beginning of the tests, the following results were obtained:

In the 5 per cent acetic acid solution and the 5 per cent lactic acid solution the concrete test pieces were almost completely disintegrated. In the 5 per cent chlorine water the fused cement concrete was slightly attacked, individual sand grains were dissolved from the surface, but otherwise the concrete was hard and strong. In the case of the 25 per cent sodium sulfate solution the same phenomenon of unimportant superficial action was just a little more pronounced.

In 25 per cent magnesium chloride, 25 per cent ammonium chloride, 25 per cent sugar solution, 10 per cent ammonia water, 5 per cent ferrous sulfate solution, petroleum, gasoline and glycerin no action or etching could be seen.

The glass vessels containing the sulfuric acid solution, magnesium sulfate solution and gypsum water were unfortunately broken in the summer of 1925 during the course of moving.

In order to determine the results with German alca-fused cement on conversion to concrete and ferro-concrete, in polished work, etc., and in special cases also for the preparation of cement products and concrete blocks, the members were requested in December to communicate results on standard testing, concrete tests, temperature rise on the setting of Alca-cement mortar and concrete, on the amount of water added for the standard tests and for conversion to concrete, and on the treatment of the freshly prepared concrete during setting and hardening. The data from this questionnaire will be published later.

The association itself started several tests with Alca-cement in December, at first standard tests; the cement used had been kept in bags for

8 months in the dry storage rooms of Huser and Company in Obercassel. After this storage period the following strength figures were obtained with varying amounts of water, after 3 days (1 day moist air, 2 days under water) using standard testing methods:

Test Piece No.	Percent of water added based on wght. of dry mixture	Compression strength kg/cm²	Compression strength, average of three tests kg/cm²
1	7	372	
2	7	359	
3	7	476	369
4	8	564	
5	8	530	
6	8	564	553
7	9	537	
8	9	577	
9	9	584	566
10	10	530	
11	10	539	
12	10	547	539
13	11	426	
14	11	446	
15	11	466	446

Buchanan Crushing Rolls

The merits of Buchanan crushing rolls are explained in a booklet just issued by the manufacturer. It is claimed by the manufacturer that rolls have no equal for capacity, power economy and low maintenance costs when the feed is not greater than 6 inches or less than ¼ inch, the discharge is not finer than 12 to 16 mesh, the reduction ratio is not greater than 4 to 1 and the diameter of the rolls is large enough to grip the maximum size of feed.

Type C rolls are designed for material not larger than approximately 4 inches. For larger sizes type E is recommended. The frame is of the box form of construction and is cast in one piece. The metal is tough close grained high tensile strength iron. Shafts are of the best quality hammered steel, machined over all and ground and polished in the bearings. The bearing metal is phosphor bronze. The bearings are extra length and are removable and interchangeable.

On the moving roll the pillow blocks are provided with a swivel device which allows the shaft to be thrown out of line without cramping the journals. The springs are extra long and are enclosed in steel bolsters.

Recent Patents

The following patents of interest to readers of this journal recently were issued from the United States Patent Office. Copies thereof may be obtained from R. E. Burnham, patent and trade-mark attorney, Continental Trust Building, Washington, D. C., at the rate of 20c each. State number of patent and name of inventor when ordering.

1,577,072. Feeder for breakers. Frank Pardee, Hazleton, Pa.

1,577,263. Sand-drier. Edward C. Kirk, St. Albans, W. Va.

1,577,329. Bucket-unloader. William A. Lewis, Ashtabula, Ohio.

1,577,376. Mill. Frank Silva, Copperhill, Tenn.

1,577,382. Crusher. Francis J. Straub, New Kensington, Pa., assignor to Crozier-Straub, Inc., New York, N. Y.

1,577,528. Tunneling-machine. William C. Jameson, Sabinal, Tex.

1,577,729. Process for the production of lasting colored stains in and upon the surface of cement or other building material. Julius Koebig, Hollywood, Cal.

1,578,021. Heated concrete-mixer. Walter C. Elze, Forest Hills, N. Y., assignor to Hauck Mfg. Co., Brooklyn, N. Y.

1,578,126. Cribbing. David A. Hultgren, Chicago, Ill., and Clarence Taylor, East Orange, N. J., assignors to Massey Concrete Products Corporation, Chicago, Ill.

1,578,139. Process for preparing cement. Walter Kirchner, Grunau, Germany.

1,578,341. Hoisting-engine. Thomas S. Miller, South Orange, N. J.

1,578,477. Sheet-rock cutter. Norman Smith and Fred W. Gallagher, Lincoln Park, N. J.

1,578,544. Mining-machine. Edmund C. Morgan, New York, N. Y.

1,578,702. Power shovel. Edwin J. Armstrong, Erie, Pa., assignor to Erie Steam Shovel Co., same place.

1,578,724. Grab-bucket. Wilks B. Gregg, Chicago, Ill.

1,578,948. Crusher. Johan R. Bakstad, Chicago, Ill.

1,579,035. Leveling device for steam shovels. Michael R. Ryan, Los Angleles, Calif.

1,579,624. Bucket. Herbert S. Atkinson, East Orange, N. J., assignor to Hayward Co., New York, N. Y.

1,579,945. Excavating and scoop shovel. Worrall S. Kelly, Chicago, Ill.

Portland Cement Statistics for March

Production, shipments, and stocks of finished Portland cement, by districts, in March, 1925 and 1926, and stocks in February, 1926, in barrels

Commercial District	Production March 1925	Production March 1926	Shipments March 1925	Shipments March 1926	Stocks at end of March 1925	Stocks at end of March 1926	Stocks at end of Febr. 1926
Eastern, Pa.							
N. J. & Md.	3,054,000	3,033,000	2,758,000	2,416,000	5,042,000	5,732,000	5,115,000
New York	484,000	374,000	445,000	335,000	1,272,000	1,629,000	1,590,000
Ohio Western							
Pa. & W. Va.	816,000	586,000	776,000	675,000	2,017,000	2,703,000	2,792,000
Michigan	566,000	223,000	428,000	390,000	1,323,000	1,780,000	a1,947,000
Wis., Ill., Ind. & Ky.	1,406,000	b1,213,000	1,214,000	b947,000	3,739,000	b3,966,000	3,700,000
Va., Tenn., Ala. & Ga.	1,064,000	1,241,000	1,048,000	1,188,000	706,000	1,111,000	1,058,000
Eastern Mo., Ia., Minn. & S. Dak.	887,000	745,000	864,000	724,000	3,271,000	3,087,000	3,066,000
Western Mo., Nebr., Kans. & Okla.	867,000	848,000	803,000	760,000	1,562,000	1,487,000	1,399,000
Texas	422,000	451,000	422,000	403,000	342,000	536,000	a488,000
Colo. & Utah	101,000	b134,000	168,000	b172,000	306,000	b206,000	244,000
California	1,128,000	b1,226,000	1,082,000	b1,224,000	514,000	b513,000	511,000
Oreg., Wash. & Mont.	239,000	249,000	271,000	265,000	375,000	462,000	478,000
	11,034,000	b10,323,000	10,279,000	b9,499,000	20,469,000	b23,212,000	a22,388,000

a—Revised. b—Figures include estimate for one plant each in Indiana, Utah, and California and are subject to revision.

Production, shipments, and stocks of finished Portland cement, by months, in 1925 and 1926, in barrels

	Production 1925	Production 1926	Shipments 1925	Shipments 1926	Stocks at end of month 1925	Stocks at end of month 1926
January	8,856,000	a7,887,000	5,162,000	a5,672,000	17,656,000	a20,582,000
February	8,255,000	7,731,000	6,015,000	5,820,000	19,897,000	a22,388,000
March	11,034,000	b10,323,000	10,279,000	b9,499,000	20,469,000	b23,212,000
First Quarter	28,145,000	25,941,000	21,456,000	20,991,000	.....	.....
April	13,807,000	.....	14,394,000	.....	19,877,000	.....
May	15,503,000	.....	16,735,000	.....	18,440,000	.....
June	15,387,000	.....	17,501,000	.....	16,409,000	.....
Second Quarter	44,697,000	.....	48,630,000	.....	.....	.....
July	15,641,000	.....	18,131,000	.....	13,896,000	.....
August	16,419,000	.....	18,383,000	.....	11,952,000	.....
September	15,939,000	.....	17,711,000	.....	10,247,000	.....
Third Quarter	47,999,000	.....	54,225,000	.....	.....	.....
October	15,992,000	.....	15,309,000	.....	10,979,000	.....
November	13,656,000	.....	10,187,000	.....	14,534,000	.....
December	a10,713,000	.....	a6,917,000	.....	a18,365,000	.....
Fourth Quarter	40,361,000	.....	32,413,000	.....	.....	.....
	161,202,000	.....	156,724,000	.....	.....	.....

a—Revised. b—Includes estimate for three plants and subject to revision.

Imports and Exports of Hydraulic Cement

	Imports 1925 Barrels	Imports 1925 Value	Imports 1926 Barrels	Imports 1926 Value	Exports 1925 Barrels	Exports 1925 Value	Exports 1926 Barrels	Exports 1926 Value
January	231,258	$364,196	360,580	$576,717	71,596	$207,547	72,939	$216,431
February	119,077	206,308	314,118	527,948	56,249	181,356	73,975	220,708
March	218,048	337,039	.....*	.....*	65,248	200,410	.....*	.....*
April	197,686	280,826	.....	.....	89,508	263,831	.....	.....
May	186,897	286,959	.....	.....	85,385	250,845	.....	.....
June	254,937	409,539	.....	.....	71,343	217,899	.....	.....
July	335,118	490,602	.....	.....	98,141	286,543	.....	.....
August	379,847	611,551	.....	.....	103,961	289,904	.....	.....
September	513,252	789,121	.....	.....	102,649	285,225	.....	.....
October	535,050	824,268	.....	.....	73,369	228,467	.....	.....
November	388,604	678,518	.....	.....	101,825	294,201	.....	.....
December	295,543	526,001	.....	.....	100,323	296,900	.....	.....
	3,655,317	$5,813,928	.....	.....	1,019,597	$3,003,128	.....	.....

Domestic hydraulic cement shipped to Alaska, Hawaii, and Porto Rico, in February, 1926a

	Barrels	Value
Alaska	386	$ 1,214
Hawaii	12,452	27,228
Porto Rico	3,116	7,247
	15,954	35,689

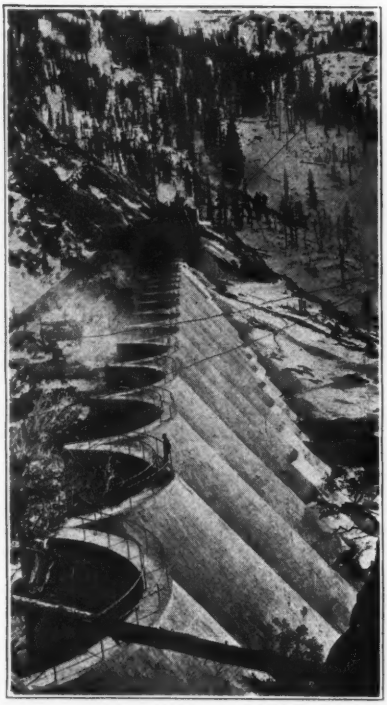
*—Imports and exports in March, 1926, not available.

Building An Emergency Crushing Plant Nine Thousand Feet Above Sea Level

GEM LAKE DAM, the huge multiple arch structure in Mono County, California, has been a debating platform for engineers since the start of its disintregation three years after it was complete in 1916. The huge structure built on the eastern slope of the Sierra Nevada Mountains to stop the flow of Rush Creek gave perfect satisfaction to its owners, the Nevada California Power Company, for two seasons but seepage appeared which grew continuously worse until drastic remedies were called for.

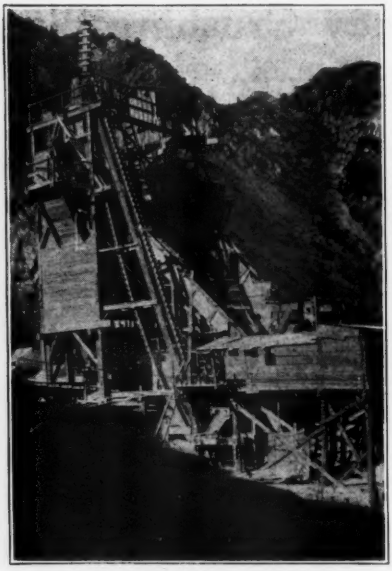
Engineers were at variance as to the cause of the failure but some of the theories put forward criticized the aggregate and pointed to the fact that certain spots in the dam showed low crushing strength and resembled the characteristics of clay after being exposed to stresses. Others believe the sand was too fine and still others thought the whole design was unsuited for this type of project.

The remedy decided upon was concrete gravity sections back of each arch. The work was done in the summer of 1924 by the Dwight P. Robinson Company. The mountain side consists of blue limestone and igneous granite, there is very little



Top of Dam

Head of Tram No. 2 Bunkers and Mixing Plant



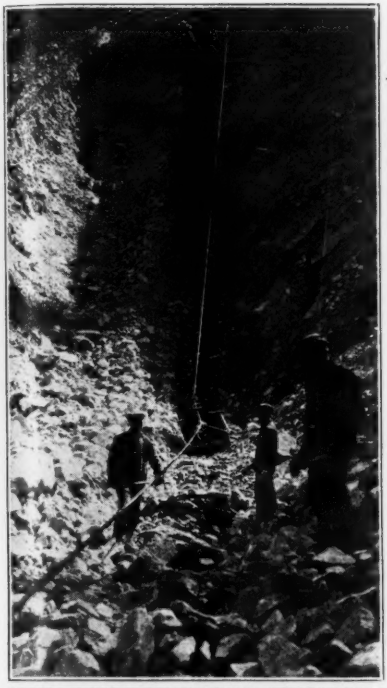
The Crushing Plant

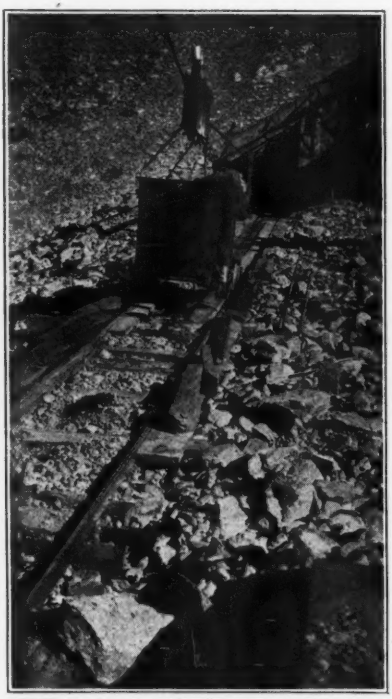
Route of Tram No. 1

sand in the neighborhood and that unsuitable for concrete and there is no earth in the locality. J. R. Hughes, who is now manager of the Bakersfield Rock and Gravel Company's plant at Bakersfield, California, was at the time master mechanic for Dwight P. Robinson Company. He designed the crushing plant which was necessary to supply the aggregate. The project itself was very interesting as it was 75 miles from a railroad and about 10,000 feet above sea level. Three long inclines and an aerial tramway had to be built for transporting the crushed aggregate.

To reinforce this multiple arch dam, 12,000 yards of concrete had to be poured and all of this was done under unusually difficult conditions especially in regard to transportation of materials. The site was 8,960 feet above sea level and 70 miles from the nearest railroad. Even after material had been trucked over the tortuous mountain trail the end had

Cement Crossing Lake 800 Feet Above Sea Level





Above, Trouble With Big Rock; Below, Crossing Lake on Bucket

Above, Buckets Landing on Rails; Below, Method of Anchoring Cableway

Above, Bucket Approaching Plant; Below, Bucket Leaving Pit

not been reached. From the end of the road it had to be carried to the job by two tramways with maximum grades of 70 per cent for a distance of 7,000 feet and transported across a lake in barges.

Because of climatic conditions the job had to be started and completed within five months. The obtaining of equipment and material and transporting it to the site took from June 1 to September 9, 1924, and by November 30, the job not only had been finished but the plant had been dismantled and all machinery and other equipment had been transported back to the railroad warehouses ready for reshipment. Such speed as this took careful planning and close coordination of workers. Perhaps the most ingenious thing about the plan of campaign against nature's obstacles was the system of conveying devised.

At the end of the truck haul all cement, lumber and other material was loaded on a single track tramway which twisted and climbed its way up 5,000 feet of the mountain's side. Sharp curves, steep grades and sometimes heavy snows made the way difficult to the shore of a lake. One storm covered the tracks with 30 inches of snow but fortunately this soon melted away. The trams were operated by a single drum built up hoist directly connected to a 100 h.p. motor. Five tons was considered a safe limit for this hoist but under emergency conditions as much as 14,000 pounds was hauled over the route. As soon as the route had been put in operation a small tug boat driven by a Red Wing gasoline motor was hauled up to the lake and launched to furnish power for barges. This tramway was used in the initial construction but before work started on the dam proper it was destroyed by a snow slide and had to be rebuilt.

The five-eighths of a mile trip across the lake was a quiet interlude before another difficult lap of the journey was taken up. On the far bank of the lake was located the crushing plant and adjoining it was the foot of tramway number two. This was a double track affair built on trestle across barren rock throughout the 1,800 feet of its length. The head of this tramway was at the dam site where the concrete was poured. All material for the aggregate was hauled over this double track system which ended 2,000 feet above the loading platform of the first tramway. The

second unit was operated by two 100 h.p. Thomas hoists.

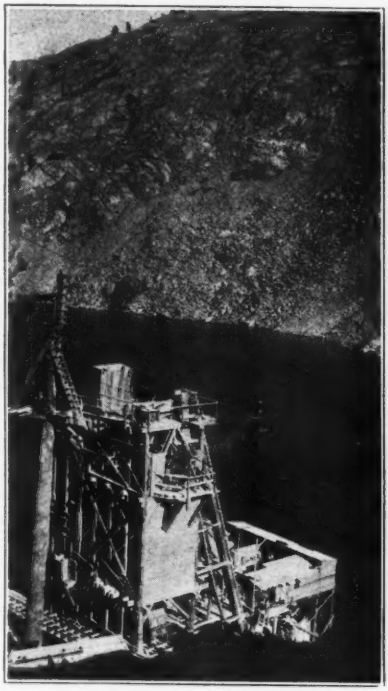
The route of the cement from the railroad to the job having been traced let us follow the course of the crushed stone and artificial gravel. The last half of the journey is the same, that is over the double track tramway from the crushing plant to the mixer but here the similarity ceases. Bringing stone by rail and trucks was out of the question for economic reasons and the only suitable material which could be found was on the other side of the lake at a point which could not be reached by a rail tramway. There was no sand and gravel to be had in the vicinity.

The first of these obstructions was overcome by an aerial tramway and the absence of sand and gravel was surmounted at the crushing plant in a manner which will be described later. The rock was loaded into the tram bucketed by a Bagley scraper operated by a 75 h.p. Western double drum hoist. The bucket which had a capacity of 84 cubic feet was designed by J. R. Hughes and built by the Stephens-Adamson Company.

The bucket was equipped with four car wheels which ran on rails laid under the chute into which the drag line scraper emptied. The tracks extended several rail lengths beyond to loading point to the spot where the cable way lifted the bucket above the rails. The purpose of the track was to avoid deflection in the cable while loading. Some trouble had been anticipated by the designer in guiding the bucket so that it would land on the rails but nothing was used other than 4x4 blocks nailed to the ties and the bucket gave absolutely no trouble by missing the tracks. The tramway was 1,120 feet between anchors. The loaded bucket was pulled by a 75 h.p. single drum Hendrie and Bolthoof hoist and the empty bucket was pulled back to the pit by a 25 h.p. Western hoist.

The entire bottom of the bucket dropped down in halves when dumping. Each half was hinged on the axles carrying the wheels. The dumping and closing were automatic, counterweights pulling the bottom back into place after the rock had emptied and the latch locking the doors after the lever had dropped off the tripper block on the return trip.

Deflection at the dumping point was avoided by placing a mast 75 feet in height, 4 feet in diameter at the butt and 2 feet in diameter at the top,



Above, Another View of Aerial Tram; Below, Tram No. 2

under the aerial at the dumping spot. As indicated previously the crushing plant was at the edge of the lake at the foot of the second rail tramway. The storage bins for the different sizes empties into 5 ton end dump ship cars spotted under discharge spouts.

The crushing apparatus consisted of three jaw crushers, a 13x24 Indiana, a 6x36 Cedar Rapids and an 8x14 Universal together with a 24 inch Symons disc crusher. The plant, which was electrically operated had a capacity of 25 tons an hour. Of this product 35 per cent passed a ¼ inch screen, 40 per cent was retained and passed a 1½ inch screen and the remaining 25 per cent passed a 4 inch screen.

This fines in this rock could not be utilized for sand and it was necessary to make the material. The task was assigned to the disc crusher aided to a certain extent by the Cedar Rapids jaw crusher. When the plant was designed it was not believed such a large percentage of fines would be required but the two machines had no trouble keeping up with the work.

The crushers were kept closed to a point where the surfaces would just clear and when the discs and dies were worn to a point where they would not function in this manner, these parts were immediately replaced. A 24 inch belt conveyor on 30 foot centers took the material discharged from the crushers and emptied into a 12 inch bucket elevator operating on 60 foot centers. This fed to a revolving screen 16 feet in length by 42 inches in diameter placed over the storage bins. All the elevating and screening equipment was furnished by the Bodinson Manufacturing Company.

It was found necessary to wash the stone and this was done by means of a high pressure nozzle which worked entirely satisfactorily for a temporary job. This washing operating preceded the crushing and was done in a long chute leading from the aerial bucket dump to the crusher. This chute contained a false bottom of steel plate with ⅜ inch perforations. The rock was held back of the washing point by a hand operated baffle gate which was opened only after the rock had been cleaned.

Duntile Mfg. Co., Newton Hook, N. Y. (Make building materials.) Capital $100,000. A., E. H. and F. M. Wheeler, incorporators.

Western Stone Producers Hold Live Meeting

Quarry operators from seven states attended the meeting of the Mid-West division of the National Crushed Stone Association held at the Jefferson Hotel, St. Louis, Missouri, April 15. Eighty persons sat down to the luncheon table and the afternoon session of the meeting was filled to capacity. A few persons had to be turned away from this session because of lack of room. Nearly every producer in Illinois was present, and the St. Louis Quarrymen's Association attended in a body.

The business meeting of the association was held in the morning with O. P. Chamberlain presiding. W. R. Sanborn, the regional vice president of the National Crushed Stone Association, presided at the afternoon session at which talks were made by A. T. Goldbeck, head of the bureau of engineering of the national association, and by J. R. Boyd, national secretary.

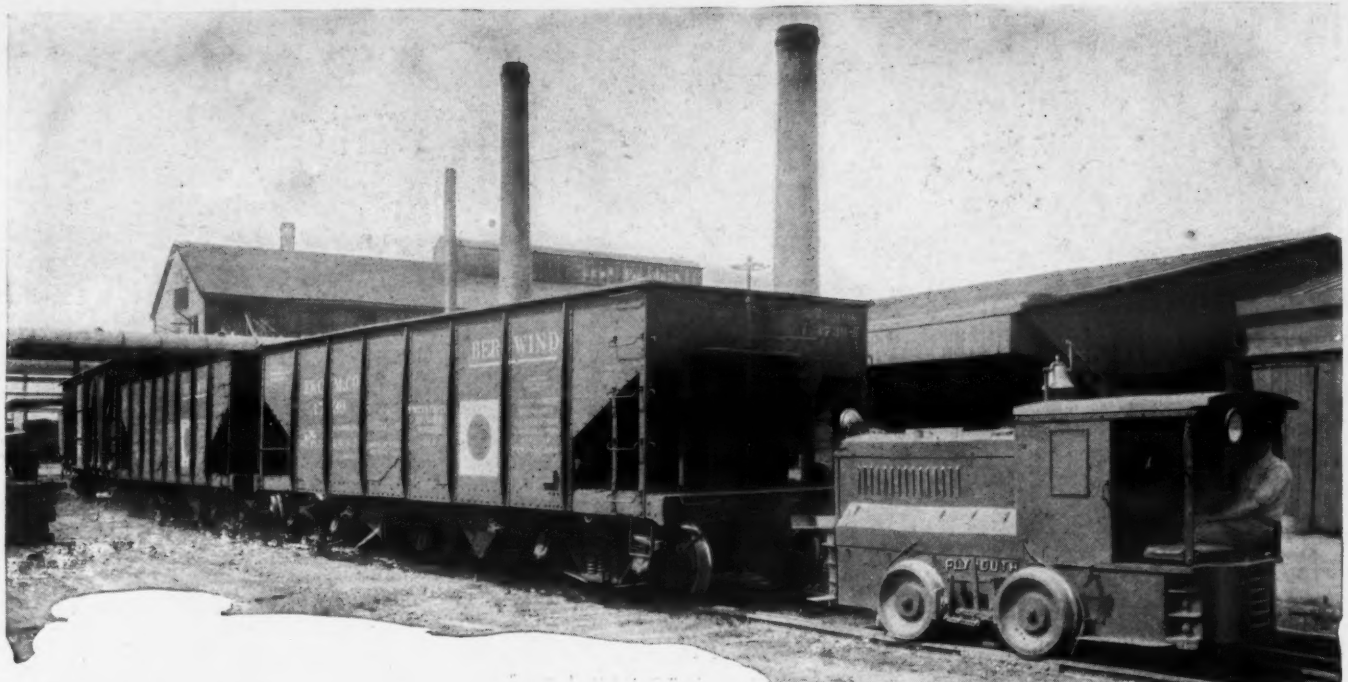
Mr. Goldbeck spoke at length on the problems confronting the crushed stone producer and answered many questions. Mr. Boyd outlined the field of the association's work and the program for the future.

A round table dinner that evening concluded the meeting and Mr. Goldbeck, Mr. Boyd and H. C. Krause, sales manager of the Columbia Quarry Company, left for Nashville, where a meeting of the Tennessee and Kentucky producers was held the next day. At a meeting in the Andrew Jackson Hotel at Nashville plans were launched for an organization of the quarrymen of the two states.

New Plant Enters Columbus

The Island Sand and Gravel Company of Columbus, Ohio, has secured a valuable river shore site almost in center of the city's principal building operations, with such natural topography as will permit storage of a quarter million tons with gravity loading. Plans are now being perfected and equipment selected. The plant will have an eventual capacity of 5,000 tons per day.

Harbor Sand & Gravel Co., Aberdeen, Wash. Capital increased from $15,000 to $75,000.



Haulage Costs Cut 55.6%

WHITALL TATUM COMPANY
MANUFACTURERS OF
GLASSWARE & DRUGGISTS SUNDRIES
FACTORY OFFICE
HILLVILLE, NEW JERSEY June 2, 1926.

used a 35-ton steam locomotive for their plant yard switching. Steam power calls for high cost fuel; time is lost in firing up, and the "stand by" expense

the 7 ton Plymouth gasoline locomotive we purchased from you about a year ago for use in our Upper Works.

The comparison shows that over a period of six years, the steam locomotive had a monthly operating expense of $417.80, whereas the gasoline locomotive for the period of 2-1-1924 to

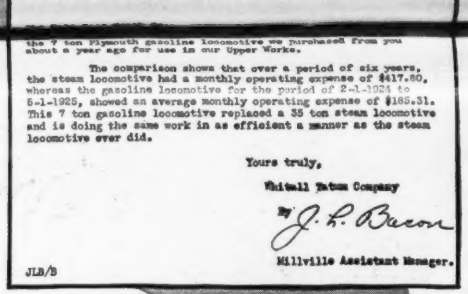
Cut 55.6%

used a 35-ton steam locomotive for their plant yard switching. Steam power calls for high cost fuel; time is lost in firing up, and the "stand by" expense cannot be avoided.

Then a Plymouth 7 ton Gasoline Locomotive was put on the job.

The Plymouth not only did the same work, in as efficient manner as the steamer, but after fifteen months a comparison of costs showed an average monthly expense of $185.31 for the Plymouth against $417.80 a month for the 35 ton steamer—a saving of 55.6%.

Plymouths are made in 3 to 25 ton sizes. Write today for Performance Bulletins showing how other plants have cut their haulage costs.



the 7 ton Plymouth gasoline locomotive we purchased from you about a year ago for use in our Upper Works.

The comparison shows that over a period of six years, the steam locomotive had a monthly operating expense of $417.80, whereas the gasoline locomotive for the period of 2-1-1924 to 5-1-1925, showed an average monthly operating expense of $185.31. This 7 ton gasoline locomotive replaced a 35 ton steam locomotive and is doing the same work in as efficient a manner as the steam locomotive ever did.

Yours truly,

Whitall Tatum Company

By J. L. Bacon

Millville Assistant Manager.

JLB/B

THE FATE-ROOT-HEATH COMPANY

Plymouth Locomotive Works

206 Riggs Ave. Plymouth, Ohio.

PLYMOUTH

Gasoline Locomotives

Here's the Pulverizer for Making Profitable Agstone

Finer Grinding Bring Better Prices

IF you plan to pulverize crusher screenings into agricultural limestone, investigate the Williams "Universal" type shown below.

It has the large capacity of most hammer mills with the added ability to grind unusually fine because of the extra long patented adjustable grinding plate. Furthermore this large capacity and fine grinding does not suffer as wear occurs, as the adjustable grinding plate can be moved up toward the hammers and the original close adjustment constantly maintained.

Recent orders include a 40-ton per hour unit to C. Stolle Quarry Co., East St. Louis, Ill.

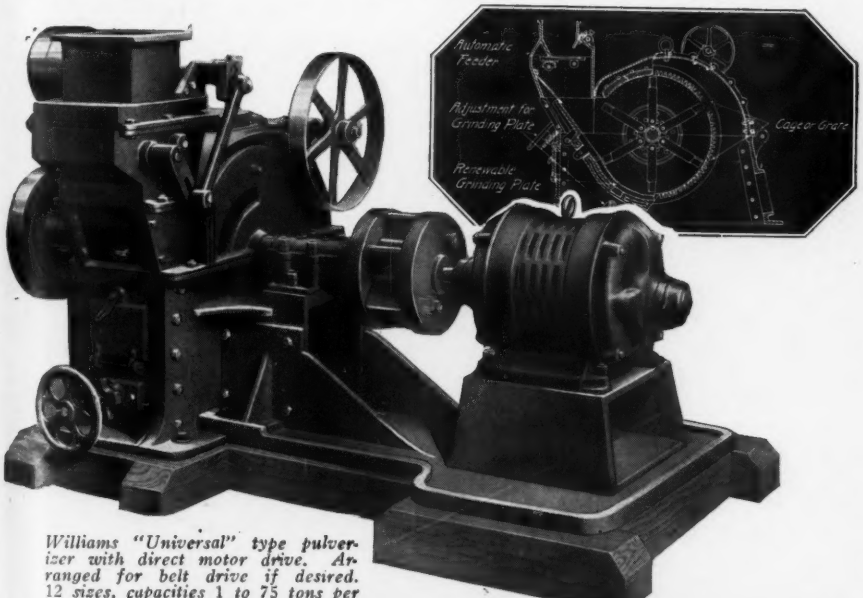
Also selected by the late Professor Cyrus Hopkins, for Southern Illinois Penitentiary, Menard. Now operating three with combined capacity of 100 tons per hour.

23 in use by Universal Portland Cement Co., 10 years or more.

Williams Patent Crusher & Pulv. Co.

802 St. Louis Ave., St. Louis, Mo.

Chicago	New York	San Francisco
37 W. Van Buren St.	15 Park Row	415 5th Street



Williams "Universal" type pulverizer with direct motor drive. Arranged for belt drive if desired. 12 sizes, capacities 1 to 75 tons per hour.

WILLIAMS PATENT CRUSHER & PULVERIZER CO. ST. LOUIS, U.S.A. "ALL" TRADE MARK REG U.S. PAT. OFF

ORIGINAL PATENTEES AND WORLD'S LARGEST BUILDERS OF HAMMERMILLS

Williams

PATENT CRUSHERS GRINDERS SHREDDERS

Producing An Amorphous Silica

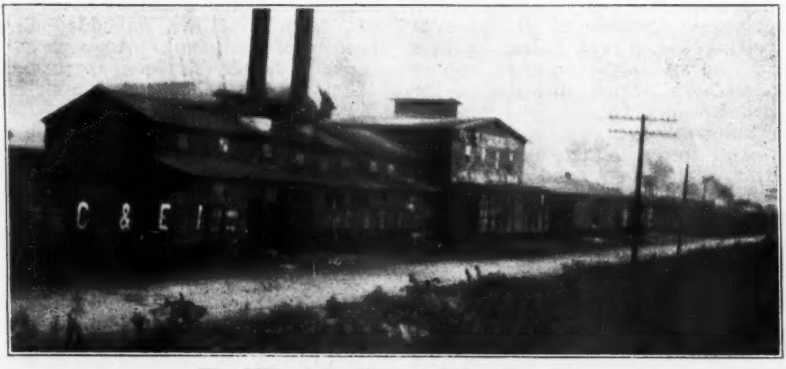
SILICA occurs in many different forms. The Tamms Silica Company of Tamms, Illinois, are operating a large deposit in the southern part of Illinois. The silica here occurs under such heavy overburden that underground mining methods are employed. This silica under a low magnification appears to be amorphous. It is nearly pure white and the purest of it is soft and very fine grained. It does not break easily and its fracture is very rough and uneven. Hard lumps of partly decomposed chert are found in the deposit. The operations of the Tamms Silica Company are in the vicinity of Tamms, Alexander County, in the extreme tip of southern Illinois, where the tail of the Ozark mountain range creeps out of Missouri into Illinois. The deposits are found in veins, generally half way up the hillside and vary from ten to fifty feet in thickness.

The material is mined like hard rock, by drifting into the hills and blasting out chambers and the waste removed by hand sorting. The men employed in the work are natives of the Ozark hills who have grown up in the business and have lived in the locality for generations. They are a clannish folk but easy to get along with and the supply of workmen is always equal to any demand.

The Tamms mine is electric lighted and the chambers are blasted out with 60 per cent nitro-glycerine dynamite. Hercules and du Pont explosives are used. Holes for the charges are drilled with a jack hammer drill supplied with air from a Schramm compressor. The vaulted chambers

Joe Webb, the Foreman

are from 20 to 30 feet across and average 10 feet in height. Pillars from 10 to 15 feet in diameter divide the chambers and support the roof. The rock comes down in pieces varying from fist to head size and is loaded by hand on wagons, which drive into the mine. It is hauled down



The Mill of the Tamms Silica Company

Entrance to the Mine

Railroad Approach to Plant

to the mill three miles away by teams. The Tamms company believes that because of the bad roads in the neighborhood and the comparative cheapness of labor it is more economical to haul by team than by truck and that it is cheaper to let out the hauling contract than to do the job. The wagons handle three tons with each load and make two or three trips each day. Fifty tons of raw material arrive at the plant each day but there is a shrinkage of approximately 25 per cent in the milling and bagging process. When the material arrives at the plant it is shoveled by hand either into a storage bin or onto a belt conveyor. This belt is supplied by the Independent Rubber Company and feeds into a number 24 American pulverizer. This machine which is of the hammer ring type, reduces the material to ¼ inch and discharges into the boot pit of a bucket elevator. This elevator is made of 10 inch rubber belting and 8 inch Salem buckets and discharges onto another rubber belt conveyor which distributes the crushed product to the feed bins of three tube mills.

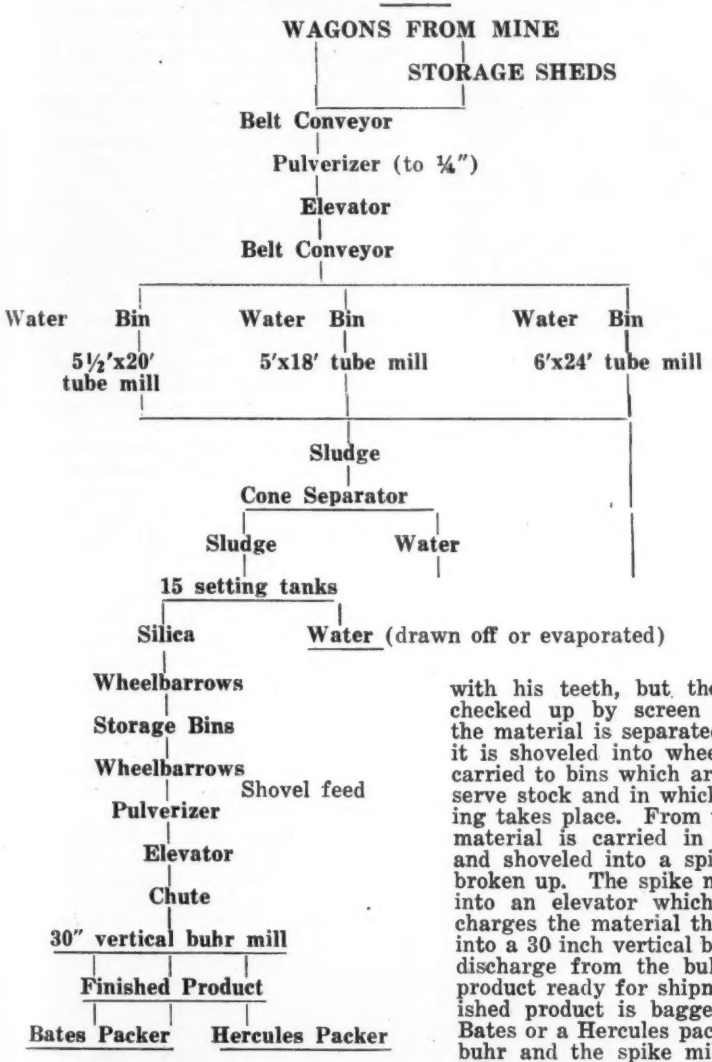
A screw feeder designed by Charles E. Hinz, the superintendent of production, feeds the material into each tube mill. Water is admitted as the material enters the tube mill so the material is ground wet. The castings for the screw feeder were made by Sprout, Waldron and Company. The feed is run off the jack shaft of the tube mill so that the intake is continuous with the grinding process and if for any reason the mill is forced to stop the feed ceases.

The three tube mills are Silex lined and charged with Danish flint pebbles. Slugs cannot be used in this operation because of the danger of contamination with iron. Two Bonnot and one Allis-Chalmers mill are used. The former are 5½ and 5 feet in diameter by 20 and 18 feet in length, respectively. The Allis-Chalmers mill is 6 feet in diameter by 24 feet in length. The discharge from all the mills is piped to a cone classifier which acts as a dewaterer. This cone is 10 feet in height and 8 feet in diameter. The water from the classifier is returned to the mills and the sludge is piped to settling tanks of which there are fifteen.

The settling tanks, which are of concrete, average about 3 feet in depth, 9 feet in width and 30 feet in length and hold about 15 tons. Coils of steam pipe are imbedded in the bottom of each tank. As soon as one tank is filled the feed is moved to another tank and the full tank is allowed to settle for an hour. Then the water is drawn off and the material left to dry. After the free water has been removed, steam is turned in the pipes in the bottom of the tanks and the remaining moisture is removed. The drying usually takes 36 hours.

The tanks are then graded or marked off into sections containing material of different grades of fineness. As the sludge enters at one end of the tank the heaviest particles

FLOW SHEET OF MILL
of
TAMMS SILICA COMPANY—TAMMS, ILL.



should settle at once, close to the feed pipe, while the finer material, kept longer in suspension, should be carried to the far end of the tank. However, through the action of eddy currents and the varying density of sludge, the separation is not accurate or uniform. Varying amounts of fairly coarse material are often carried with the fines to the far end of the tank. A man experienced in grading this form of silica grades a tank by tests for grit with his teeth, but these tests are checked up by screen tests. After the material is separated into grades, it is shoveled into wheelbarrows and carried to bins which are used for reserve stock and in which further drying takes place. From these bins the material is carried in wheelbarrows and shoveled into a spike mill to be broken up. The spike mill discharges into an elevator which in turn discharges the material through a chute into a 30 inch vertical buhr mill. The discharge from the buhr mill is the product ready for shipment. The finished product is bagged by either a Bates or a Hercules packer. Both the buhr and the spike mill were manufactured by Sprout, Waldron and Company.

Steam power is used throughout the plant. The steam is generated in four horizontal return tubular boilers with forced draft. They are manufactured by Walsh and Weidner. The engine is a 300 h.p. St. Louis Corlis. Power is transmitted to the main line by a Medart rope drive.

The low labor market has caused the management to hesitate frequent-

ly on the question of installing more machinery. While not on a piece work basis, the men in some of the operations are allowed to quit when a day's allotted work has been completed. This works advantageously both to the company and the men. The wheel barrow gangs are frequently able to quit an hour or two before their time and the company has the advantage of rapid handling.

Four grades of product are marketed as follows: Gold Bond—all through 325 mesh, Silver Bond—all through 200 mesh and 98 per cent through 325, Velvetine—all through 180 mesh and 96 per cent through 325 and 00 Dust which is an impalpable powder. Velvetine is the most important product from a tonnage standpoint. It is used extensively.

Portland Cement Assn. Moves To Its New Home

The general offices of the Portland Cement Association, which have been at 111 West Washington street, Chicago, have been moved to the association's new building at 33 West Grand avenue. The entire building is occupied by the Portland Cement Association and its research laboratory. For the past ten years the laboratory has been located in the Lewis Institute and heretofore conducted cooperatively by the institute and the association.

The architects, Holabird and Roche, have produced a handsome five-story and two-basement building, resting on thirty concrete caissons carried down to firm bearing. This structure is regarded by engineers, architects and builders as representing the highest type of fire resistive construction and also as a worthy addition to the rapidly growing list of structures which typify the architectural possibilities of concrete.

The Turner Construction Company of Chicago and New York, which was awarded the contract for this building, began excavation in August. The greater portion of the work was carried on during cold weather. The usual precautions of heating aggregates and protecting concrete from freezing were followed. Floor by floor, the building was enclosed with tarpaulins and heated with salamanders. As a matter of fact, winter temperatures were in no sense a handicap to the orderly and scheduled progress of the work.

The sub-basement contains the heating, mechanical and electrical equipment servicing the building. The heavier laboratory testing machines are installed in the basement proper, which also contains moist rooms and other facilities for storing the thousands of concrete cylinders which month by month and year by year as they are submitted to test, disclose the results of the many carefully planned researches constantly being conducted.

Other laboratory equipment, a laboratory machine shop, shipping and receiving rooms for the building, reception room, information desk and telephone switchboard are on the first floor. The lobby is a revelation to those unfamiliar with the possibilities of precast concrete stone. Lighting in the reception room is from flood lights, mounted on precast concrete standards.

The precast stone stairway leading to the second floor contributes to other architectural attractions of the lobby. On the second floor is the chemical laboratory and the offices of the director of research and his assistants. The general storage facilities for bulletins, records, etc., are also on this floor. In addition there is a small auditorium and stage.

The third floor is devoted to offices of the structural, railways and cement products bureaus and to the association's reference library. The library probably contains the most comprehensive collection of literature devoted to the uses of cement and concrete in existence. It is a public library in charge of trained librarians, whose services are always at the disposal of architects, engineers, contractors or any others who desire to avail themselves of its many bound volumes and extensive reference files on the uses of cement and concrete. Stenographic and mailing departments are on the fourth floor.

The offices of the general manager, assistant general manager and several of the general office bureaus such as advertising, publications, general educational, highways, accident prevention, auditing, purchasing, are on the fifth floor. There is also a conference room for staff meetings.

Economical Sand and Gravel Corp. Capital $20,000. N. de Stefano, T. Snee, L. Vignola, incorporators. (Attys., Elliott & Robeson, 277 Broadway, Manhattan, N. Y.)

A Quarry Which Attracts Workmen

Midway between Toronto and Montreal, near where the last of the Great Lakes empties into the St. Lawrence, a short way from the little town of Granoque, is probably the most completely equipped granite operation, as far as quarrying is concerned, in the province of Ontario. It is the quarry of Campbell and Lattimore at Findley, Ontario. The stone is a rich ruby color called Frontenac Red. It is a heavy coarse-grained granite weighing approximately 176 pounds to the cubic foot.

The firm of Campbell and Lattimore of which W. C. Campbell and C. H. Lattimore are the principals maintain headquarters at Toronto. They produce a high grade monumental stone, paving blocks and rough stone for crib filling in harbors and breakwaters along the shores of Lake Ontario. Although a goodly portion of the product is used for monumental stone there is no finishing mill at the quarry. The product is shipped out by rail. The main line of the Canadian National Railways passes near the spot and a siding is built directly into the quarry running the entire length of the face. This obviates great rehandling expense. The layout is very compact, the siding passing directly back of the compressor house and beneath five chutes which load the rough stones into cars. The monumental blocks are loaded by derricks.

Outside the Cutters Shed

The blacksmith shop, where all small repair work is done, is about 200 feet from the quarry pit out of the way for operating purposes but near enough for easy access. As a safety measure, the powder house and magazine are quite distant from the pit being located in an oak grove on the property.

One of the features of this operation is the spacious, neatly kept up camp for employees a short way from

Lower Face of Quarry Worked Only for Paving Blocks

Paving Cutters at Work

the railroad station. This will accommodate 100 men and the company employs a large force during the summer months. In the winter when the force is smaller the men are housed in berths in the cutters' shed.

The management of the company believes it is possible to obtain the type of men they want at their plant only when life is made comfortable for them. Kingston, the nearest city, is ten miles away and not easily accessible for the employees and in order to make the non working hours pleasant for the men in addition to the comfortable sleeping quarters and large dining room, the company has furnished the place with two radios, a phonograph and a piano. These are greatly appreciated by the men and are used to the fullest extent. Drinking water is obtained from a clear spring at the foot of the quarry.

Power is furnished by both gasoline and steam engines totaling 250 horse power. It has a capacity of 1,000 tons of rock a day. Much of the work of the cutters is done out of doors in the summer time and the vicinity of the cutters' shed is a popular place with the workmen.

Large tripod drills and Ingersoll-Rand jackhammers are used for quarrying. Small plug drills are used by the stone cutters. All are run by compressed air as hand power has been done away with completely thus making work faster and much easier for the men who have found great difficulty cutting this hard stone with hand drills.

The air lines run the full 200 feet of the length of the cutters' shed with drops for every berth. The air line also follows around both sides of the quarry with single working lines dropping over the face. The quarry is worked in "posts," a gang taking a section of the face and breaking and drilling the rock to the dimensions required. A typical "post" is shown in an illustration accompanying this article. This "post" is about 15 feet wide, 40 feet deep and 32 feet long. The lower face of the quarry at present is used only for paving stone. It is worked only when the upper face is filled up. In 1924 the quarry turned out 400 cars of cribbing stone, 21 cars of monumental, and 1,500,000 paving blocks. This was not considered a big year for the operation. The quarry was opened in 1920.

Montauk Sand and Gravel Corp., Montauk, N. Y. Capital: 300 shares of common stock, no par. A. Pearson, T. E. Ringwood and F. Hoerger, incorporators. (Atty., J. D. Rogers, Mineola, N. Y.)

Face of Quarry

Efficient Even If Not Standard

WASHBURN and Hall, a general contracting firm of Portland, Oregon, operate a modern river bottom sand and gravel plant at Myrtle Creek, in the south eastern part of the state on the Southern Pacific Railroad. The plant is electrically operated throughout and is primarily for the production of railroad ballast. A rail tram from the water edge to the screening and washing plant plays an important part in the operation. The excavating and conveying of the material to the tram hopper is by means of an electric hoist manufactured by Hesse-Ersted Iron Works, and a 4 cubic yard Sauerman drag line scraper. A 150 h.p. 220 volt induction motor is used. This method of operation is particularly suited to this locality as most of the gravel deposits lie below water level. The material is thoroughly mixed and partly washed when it reaches the plant, which naturally makes for steady and efficient operation.

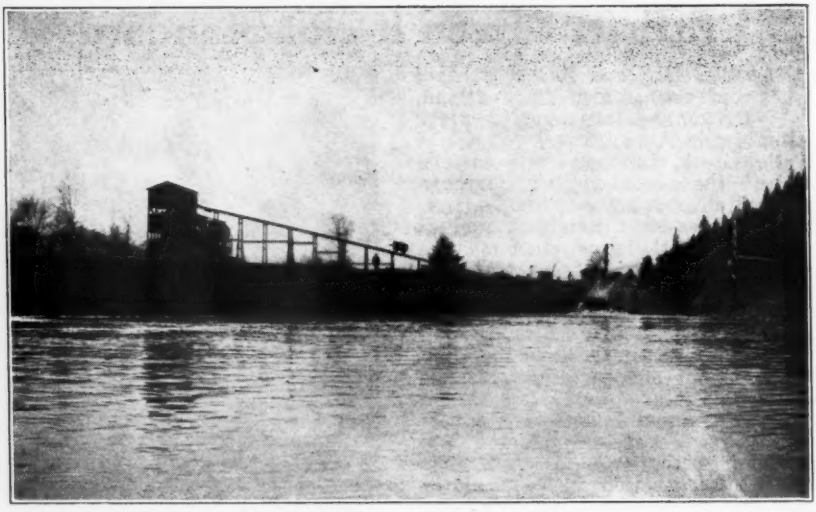
The tram incline is 200 feet long and the raise about 45 feet. The car is of 3½ cubic yards capacity and is capable of making a trip in two minutes. It is self dumping and up to the present time has conveyed something over 150,000 cubic yards of material with but very little attention. The car was designed by Washburn and Hall and manufactured by the Albany Iron Works.

Type of Bucket Used

Water for washing is obtained by means of a 3 inch Byron Jackson centrifugal pump, driven by a 20 h.p. motor. A perforated pipe of the size needed is at the receiving end of each of the two screens and the rock is rendered clean enough for ballast requirements which are very rigid here.

From the upper tram hopper the material is fed manually to a 42-inch

Gettings the Pit Opened; a View Shortly After Start



Pit and Plant As They Look Today

by 19-foot revolving screen with sand jacket. The ¼ and ¾ inch size products are here taken out and dropped into their respective bins. The rejects from this screen fall into an 8-inch Traylor Bulldog crusher and are conveyed by means of a short bucket elevator to the secondary screen similar to the scalping screen previously mentioned. Here, however, a sand jacket takes out ¾ inch screenings and finally the ballast is dropped through its 1⅝-inch square punched plates into the last of the four bins.

The reject from this screen is returned to the re-crusher by means of a metallic conveyor designed by the owners of the plant. The re-crusher is a number 3 Allis-Chalmers crusher with specially designed concaves for the particular size product in mind. Both crushers deliver their output into a common hopper and are driven from a common line shaft.

This plant was built solely for the purpose of making ballast and the designers have kept this fact in mind at all times. Thus the crushing and

Plant Showing Tram Car With Load; Note "Sails" to Keep Out Rain

Load Leaving Plant

screening machinery does not follow the standard general plan of commercial plants. Rather it seeks to produce a minimum of by-products (for all materials other than ballast must be considered by-products as far as this plant is concerned).

The average monthly output is 10,000 cubic yards. This however is for one 8 hour shift, and can be increased with very little effort. Seven men operate the plant and load the material. The loading is made easy by means of an inclined spur, the cars being handled by gravity and allowed to drift away from the plant when loaded.

The screens and all necessary blanks are manufactured by Hesse-Ersted Iron Works. The manganese steel is cast by The Electric Steel Foundry of Portland. The plant is under the supervision of Dale G. Lofting.

Plymouth Makes Change in New York

The Fate-Root-Heath Company, Plymouth, Ohio, manufacturers of Plymouth Locomotives, has placed John H. Neafie and George H. Fanning with offices at 50 Church street, New York, in charge of their district sales office for the New York territory. Mr. James A. Ridgway will continue to act as District Sales Representative for the New England territory.

Pittsburgh Vibratory Screen

Vibrations are caused in the Pittsburgh vibratory screen through an eccentric shaft mounted in self aligning ball bearing pillow blocks. All moving and wearing parts are above or outside the path of the material to be screened. Because of its design, the screen cloth must vibrate completely over the entire surface with a definite action relative to the eccentricity if the driving shaft.

The vibratory action is always constant and continuous through every revolution of the driving shaft, regardless of the variable load. The screen cloth is mounted on a steel frame securely fastened to supporting members. These supporting members are carried on four coil springs which float the screen frame. Attached to each spring is a connecting rod, the upper end of which is connected to the main driving shaft through self aligning ball bearing connecting rod bearings.

The main shaft is three inches in diameter to insure ruggedness. The drive is by a pully mounted to the main driving shaft to which the motor —mounted apart from the screen frame—is bolted.

New Uehling Catalog

The Uehling Instrument Company are distributing a new catalog number 150 covering their combined barometer and vacuum recorder for use with steam turbines. This instrument records the absolute back pressure of the turbine exhaust, that is the true vacuum corrected for barometric changes. The importance of this reading is apparent when it is considered that a drop of one inch of mercury in the turbine's back pressure necessitates an increased steam consumption of 5 to 15 per cent per kilowatt-hour produced, depending upon the existing back pressure and the type of turbine.

High accuracy is claimed for the instrument because of the mercury column principle employed. Great legibility and sensitiveness are secured by recording only the working part of the range (either 25 to 31 inches or 20 to 31 inches of mercury) over nearly the full face of the chart. The bulletin includes valuable turbine performance data, a list of users, typical charts, sectional views and dimension diagrams, including reference to a new model instrument for flush mounting on panel boards.

Distribution of Cement

The following figures show shipments from Portland cement mills distributed among the States to which cement was shipped during January and February, 1925 and 1926.

Portland Cement Shipped From Mills Into States, in January and February, 1925 and 1926, in Barrels*

Shipped—	January		February	
	1925	1926	1925	1926
Alabama	85,410	129,291	103,513	145,636
Alaska	132	165	0	264
Arizona	34,370	38,869	25,945	28,956
Arkansas	41,376	46,708	44,352	55,984
California	988,883	931,238	753,123	714,783
Colorado	42,425	29,203	69,871	51,068
Connecticut	34,810	40,420	50,026	29,323
Delaware	5,786	8,815	9,444	6,437
District of Columbia	37,285	38,410	65,176	47,086
Florida	265,463	483,824	227,811	445,674
Georgia	93,062	80,129	98,569	86,417
Hawaii	417	10,757	0	15,830
Idaho	2,598	19,198	11,029	19,524
Illinois	463,388	323,947	378,947	429,654
Indiana	139,782	85,724	143,464	121,253
Iowa	53,044	28,439	52,039	50,077
Kansas	33,588	56,598	120,405	114,296
Kentucky	52,013	35,560	68,970	56,249
Louisiana	75,992	65,695	97,638	84,706
Maine	4,837	20,310	5,238	19,084
Maryland	47,635	79,497	98,231	77,537
Massachusetts	113,101	101,327	134,591	57,390
Michigan	190,905	222,061	248,240	253,661
Minnesota	59,395	66,063	97,034	72,714
Mississippi	29,867	44,140	28,564	47,179
Missouri	115,141	137,343	162,992	202,914
Montana	5,334	9,716	6,093	9,867
Nebraska	31,832	23,788	46,281	49,054
Nevada	2,492	2,508	5,177	5,754
New Hampshire	9,419	17,081	15,911	12,750
New Jersey	157,612	254,912	243,534	163,588
New Mexico	7,911	33,613	10,320	14,308
New York	400,896	571,447	587,674	434,323
North Carolina	79,817	81,764	128,770	139,656
North Dakota	1,380	3,338	3,742	4,903
Ohio	259,628	220,728	271,075	250,265
Oklahoma	58,872	101,087	155,083	167,043
Oregon	54,117	53,995	60,816	58,991
Pennsylvania	288,916	426,140	421,519	351,940
Porto Rico	.....	.....	.....	.....
Rhode Island	15,668	18,694	17,908	10,166
South Carolina	46,840	44,723	73,312	56,022
South Dakota	4,331	6,413	14,528	18,848
Tennessee	69,669	66,379	87,499	86,871
Texas	260,540	170,231	345,057	364,197
Utah	3,794	10,655	16,821	15,613
Vermont	3,129	2,218	3,060	1,640
Virginia	54,455	61,645	95,942	77,572
Washington	85,969	72,393	90,669	77,936
West Virginia	45,912	39,983	56,629	45,121
Wisconsin	113,396	60,400	73,320	80,066
Wyoming	3,492	5,797	9,181	11,710
Unspecified	15,964	17,162	26,430	52,720
	5,092,090	5,600,541	5,961,563	5,794,530
Foreign Countries	69,910	71,459	53,437	25,470
Total shipped from cement plants	5,162,000	5,672,000	6,015,000	5,820,000

*Includes estimated distribution of shipments from three plants each month.

Estimated Clinker (Unground Cement) at the Mills at End of Each Month, 1925 and 1926, in barrels

Month	1925	1926	Month	1925	1926
January	7,017,000	9,074,000	July	6,961,000	.....
February	8,497,000	*10,931,000	August	5,640,000	.....
March	9,962,000	12,277,000	September	4,561,000	.....
April	9,731,000	.....	October	4,086,000	.....
May	9,053,000	.....	November	5,013,000	.....
June	7,937,000	.....	December	*6,469,000	.....

*Revised.

Hydraulic Stripping of Overburden

IMPROVEMENTS and changes in the plant arrangement and operating methods of the Acme Limestone Company at their crushed stone plant at Snow Flake, West Virginia, have been rather numerous during the past operating season. The outstanding change in method had to do with removing the overburden. The quarry is very badly seamed at the top and the overburden problem was serious. After considerable investigation and study the Acme Limestone Company decided to install a hydraulic stripping plant for the removal of this overburden. The overburden is a fairly heavy red clay which is not hard to cut and gets into suspension very easily. The condition is such that the water is nearly always carrying the maximum amount of waste. The hydraulic stripping plant has proven to be a success and we are pleased to present our readers with the details of this plant and several excellent illustrations of actual conditions at the plant.

This stripping plant consists of a 4 inch four stage Allis-Chalmers centrifugal pump driven by a 20 h.p. Allis-Chalmers slip ring motor. The current is supplied at 2,300 volts. The pump house is located on the bank of Greenbrier River about 400 feet from the quarry. The main hydraulic feed line, which runs from the pump to the top and far end of the quarry, is 8 inch American spiral pipe. This line is laid 150 feet back from the face of the quarry. Branch lines of 4 inch pipe from Ts spaced at intervals of about 200 feet, carry the water to the stripping nozzle. A style A Universal stripping nozzle is being used. Three different size tips are employed, i. e.,

Pipe Line from Pump House to Top of Quarry

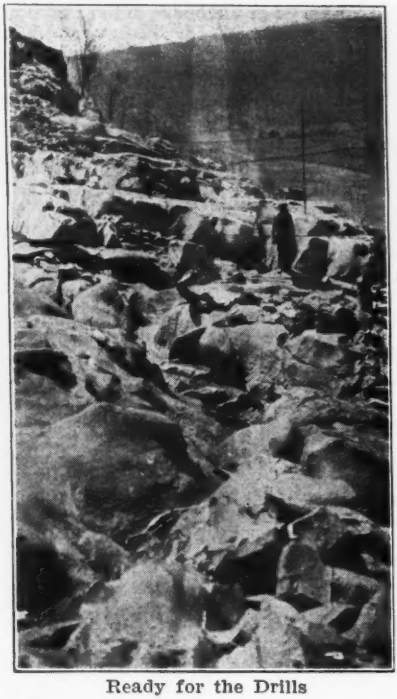
Panorama of Quarry

Cleaning Out a Big Seam

The Nozzle in Action

View of a Big Seam After Being Cleaned

Coming Over Quarry Face



Ready for the Drills

Ditch Carried Under Tracks

Ditch Across Quarry Yard

1, 1¼ and 1⅝ inches. The 1⅝ inch tip is usually used, however. The nozzle is connected to the 4 inch lines by a 4 inch hose.

The illustrations show that the stone is very badly seamed at the top. Some of these seams are as much as thirty feet in depth. The deepest of these seams are cleaned by the hydraulic method without difficulty. A junior stripping outfit is used for working in close places. This outfit consists of a 2½ inch hose with an ordinary nozzle. The pressure is regulated so as not to exceed 100 pounds. This junior outfit is only used in places where it is impossible to work with the Universal stripping nozzle.

The water, after going over the face of the quarry, is caught in a ditch running very close to the face of the quarry and carried across the quarry yard in ditches to convenient points where it is collected into a common sluiceway which in turn carries the water and waste under the Chesapeake and Ohio Railroad tracks and back into the Greenbrier River at a point a little below the intake of the pump.

The quarry has sufficient pitch making it practical to secure a good swift flow in the gathering ditches. The elevation and the close proximity to the river are ideal factors in sluicing the water from the quarry to the river.

The Acme Limestone Company produces crushed limestone for ballast, concrete construction and highways. They also product agricultural limestone. The officers include J. F. Prince, president; T. L. Woodson, vice-president; and J. A. Rigg, secretary, treasurer and manager.

Single Pass Boilers

Believing that the boiler is perhaps the least understood of the major equipment entering into steam power production, the Edge Moor Iron Company has issued an attractive booklet describing the operation of its single pass boiler.

The Edge Moor single pass boiler is a complete generating unit in itself. It contains a super heater and mechanical soot blowing equipment and is enclosed in a sectional air tight casing. When erected it is ready for furnace and stack connection, no other appliances being required.

Feed water is introduced at any temperature into the rear of the heating section. It follows a long path of tubes meeting gasses of progressively higher temperatures. Thus the water is heated gradually as it moves forward and by the time it is ready to enter the steaming section its temperature is that of saturated steam.

In the steaming section this water is circulated in a closed circuit and being exposed to the hottest gasses and the radiant heat of the furnace quickly changes to steam and is carried to the super heater. In the super heater means are provided for the control of steam temperature. A practically constant temperature can be maintained by the use of dampers operated by a motor and controlled by a thermostat.

New Incorporations

The Bellaire Sand & Gravel Co., Bellaire, Ohio. Capital $50,000. Incorporators: J. E. Green and J. E. Griffin.

Superior Sand & Gravel Co., Seattle, Wash. Capital stock increased from $10,000 to $100,000.

Consolidated Asphalt Corp. Capital $200,000. F. T. Reiner, J. T. Keller, A. F. Louprette, incorporators. (Attys., E. M. and P. Grout, 115 Broadway, Manhattan, N. Y.)

The Earlville-Hugo-Stewart Lake Sand Company, Cleveland, Ohio. Capital $1,000. Joseph P. and Angela Bender, Helen M., Frank A. and Edward A. Brown, incorporators.

Rusciano Cement Block Co. Capital $5,000. G., J. and A. Rusciano, incorporators. (Atty., J. H. Marino, 41 E. Forty-second St., New York City.)

Builders Material Co., Fort Worth, Texas. Capital $7,500. Incorporators: E. F. Spring, L. J. Jordan and J. R. Gillam.

Tiffany Sand and Gravel Co., Milwaukee, Wis. Capital $125,000. George W. Paine, Arthur A. Mueller and R. Alger Dake, incorporators.

The Oakhill Gravel Co., Springfield, Ohio. Capital $15,000. Incorporators: Riley Smith and Florence G. Guthrie, George T. Guthrie, Clem and Florence Beals.

Oaks Sand and Gravel Co., Bayside, N. Y. Capital $10,000. G. W. Henschel, A. Williams, F. Morgenweck, incorporators. (Atty., F. L. Giusti, Bayside, N. Y.)

The Service Gravel Company, Marysville, Mich. Capital $24,000.

Quarrying for Small Sized Stone

VIRGINIA road building and the general renaissance of the Old South have called for a great deal of hard crushed stone and to meet a part of this demand the Belmont Trap Rock Company was called into existence. It operates two quarries, one producing an excellent grade of trap rock, which is used chiefly for road building and the other crushed limestone, which is used both for roads and concrete structures.

The trap rock quarry is at Trap Rock, Virginia, and the limestone quarry is at Staunton. The operations are somewhat similar, but only the latter will be discussed in this article. There is no particular labor problem in this district and much of the work which in other districts would be done by machinery in this locality is done by hand because of the more reasonable labor scale.

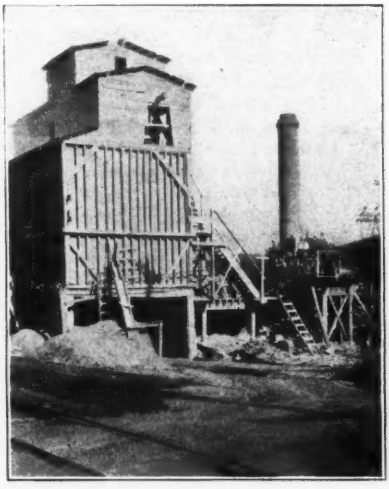
The plant has a capacity of 150 tons a day and employs 15 men, including those engaged in stripping and blasting, mill hands and quarry men. After the overburden has been removed the drilling is done by two Ingersoll-Rand jackhammers, putting down holes 14 feet in depth. The quarry face is about 60 feet high and is worked down in benches. The first bench shoots out rather large sized rocks but the others come out in good shape requiring but little secondary blasting. Air for the drills is supplied by a Sullivan 9x8 compressor.

Tracks run down an incline from the crusher house to the quarry floor and branch out in six directions. One loader is assigned to each track and when the cars are filled they are pulled across the quarry floor to the foot of the incline by a mule. The cars, which hold two yards each, are side dump and are pulled to the top of the incline by a friction hoist. The rock is there dumped into a number 5 Austin crusher. A Good Roads bucket elevator, having 18 inch buckets on a double chain and 55 foot centers, takes the material directly to the screen which is also a Good Roads Machinery Company product.

This screen is 29 inches in diameter and 20 feet long and sets lengthwise of the storage bins. It separates the stone into four sizes and returns the over size to a number 3 Austin crusher. Chutes take back the oversize and carry the finished product to the four storage bins each of which has a capacity of 100 tons. The smaller crusher also feeds into the previously mentioned bucket elevator.

The working scheme of this plant gives a large percentage of small stone which is the thing desired for the company's market. The entire plant is electrically operated, current being purchased from a local company. The air compressor is driven by a 20 h.p. Westinghouse motor and the crushing plant by a 50 h.p. General Electric motor.

The Limestone Quarry



Belmont Trap Rock Co. Plant

Shipping facilities are exceptionally good. The Chesapeake and Ohio Railroad runs by the plant and a siding goes directly in front of the loading bins. The arrangement does not permit gravity loading into the cars from the bins and a small portable elevator is used for this type of loading.

The company has a large trade in the locality and trucks are able to drive directly under the storage bins for loading by gravity. C. M. Lawrence is president of the company and C. W. Lawrence is treasurer and manager.

New Pyrometer Controller

A new Bristol's pyrometer controller model 479 has been developed which is the result of four years experimental work and also trial under actual operating conditions in the field. It not only includes the recent improvements found in other types of Bristol's pyrometric equipment; but also incorporates many additional and exclusive features.

An extra wide scale, 7-inches in actual measurement, is an important feature of this new controller. All parts of the governor mechanism used to regulate the speed of the driving motor and gears are accurately aligned and doweled to maintain permanent adjustment. The motor, with horizontal axis, is connected to the driving shaft by means of a non-metallic coupling which reduced friction and noise.

The mechanism which transmits power from the cam to the switch, and which causes the switch to move up and down about four times a minute, is accurately set up and adjusted with set screws.

The plane of travel for switch is fixed, and so designed to be horizontal when installed for operation. Other parts are carefully adjusted with this as a reference plane. The millivoltmeter movement is accurately adjusted, so that the pointer swings in a plane absolutely parallel to the plane of motion of the switch.

After the pointer has been aligned to follow the proper path, the anvil or plate against which the pointer tip, or steeple, is pressed, is adjusted so that the steeple or the pointer will always have sufficient clearance from the plate; but will still move a minimum distance when the switch is brought up against it.

The steeple which takes the pressure when the switch is brought up, is in effect, a small inverted wedge, the base of which is brought to rest on the anvil plate. The apex of this wedge is in contact with the small button which throws the switch over. It is apparent that the pressure on the steeple, is all absorbed by the plate against which it is pressed. There can be no lateral thrust on the pointer, and no force along the pointer arm towards the pivots.

The complete moving machine mechanism which supports the switch is assembled in one unit, which unit is supported rigidly in a bearing having a total area of about 4.5 square inches, and is 6 inches long. The switch-supporting mechanism is continuously held up against the depressor arm by a stiff spring, which supplies the power to raise the switch. The motor-driven cam forces the depressor arm down against the center shaft of the switch-supporting mechanism, which lowers the switch; the spring forcing it up when the depressor arm is raised. A small hinged cover is used to enclose the adjusting knob. This knob cannot be operated until the cover is opened; and the act of opening the cover automatically forces the switch mechanism to its lowest position, where it is entirely free from the pointer. With this provision there is no possibility for the operator to damage the millivoltmeter movement by attempting to set the index at the instant when the switch is in contact with the pointer steeple. Actual tests made with this new controller prove, that a movement of the pointer which is too small to be observed with the naked eye, will decide whether contact is made on the high or low side. This extremely close operation eliminates the need for partial or set-back scales.

A Weather Guide

The Hardings Company are becoming quite versatile in their accomplishments. Their latest line is weather forecasting, which we believe is designed for a limited period only—when the golf season is at its height. If you need a guide to aid you in making your appointments, we suggest you write them for a copy of their Weather Forecast. We are informed it is absolutely free. You don't even have to buy a Hardinge Mill!

Simplicity in a Crushed Stone Plant

THE new modern crushed stone plant of the Rock Hill Quarry and Construction Company is situated on a 40 acre tract in the heart of the suburban district immediately west of St. Louis, Missouri. The plant is on Rock Hill Road and the Creve Coeur Branch of the Missouri Pacific Railroad between Clayton and Manchester Roads.

The quarry was opened in the spring of 1924. Developments and improvements in both the quarry and plant have resulted in the completion of the original plans. The quarry is a long hillside operation approximately 1,500 feet in length, with an average overburden of ten feet. The rock is a light gray limestone of good quality running to a depth of 250 feet. The present plant capacity is 2,000 tons daily.

Drilling is accomplished with electric well drills working at present on a face of 40 feet. A 50 B Bucyrus steam shovel loads the rock into Western dump cars which are hauled to the crushing plant by an eight ton Plymouth gasoline locomotive to the crushing plant. An Erie caterpillar steam shovel is used in stripping and steam locomotives are used in hauling away this waste.

The crushing plant consists of one primary number 10 Allis-Chalmers gyratory crusher and two number 5 Allis-Chambers secondary crushers. The primary crusher is located on the quarry floor and the discharge from this crusher is elevated to the secondary crushers. A second elevator takes the product from the secondary crusher to a 96 foot screen which discharges the crushed stone directly to the bins. There are sixteen storage and unloading bins equipped with side chutes for car loading and bottom bin gates for truck loading.

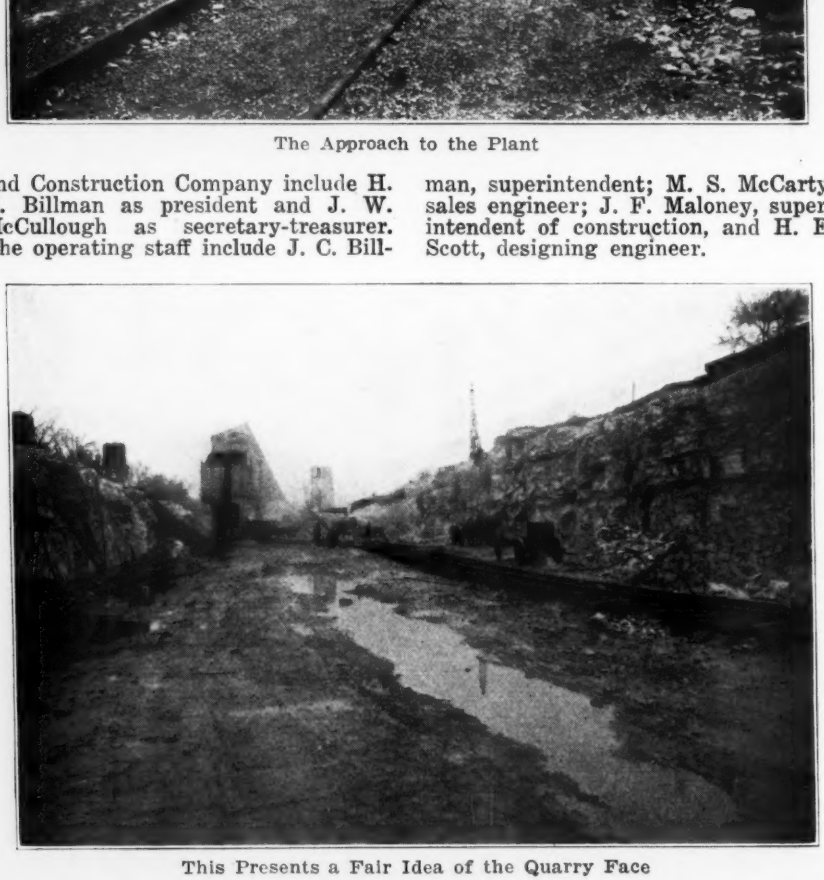
The product is largely marketed locally for road construction and general concrete work. There are some improvements still to be made in the plant, among which will be the construction of additional bins, extending the rotary screens, and the installation of vibrating screens.

The officers of the Rock Hill Quarry

Showing Part of the Quarry and the Plant In the Distance of The Rock Hill Quarry and Construction Company

The Approach to the Plant

and Construction Company include H. E. Billman as president and J. W. McCullough as secretary-treasurer. The operating staff include J. C. Billman, superintendent; M. S. McCarty, sales engineer; J. F. Maloney, superintendent of construction, and H. E. Scott, designing engineer.



This Presents a Fair Idea of the Quarry Face

Strength of Masonry at Early Stages

By J. S. Elwell

Manager Construction Department, National Lime Association*

MORTAR enters into every type of construction to a greater or less degree. It may be used only in foundation walls, or in curtain walls which carry little if any load, or it may be the tie that binds the whole frame of a structure together. Consequently, data on masonry strength is vital.

A series of tests was recently completed at the Rock Island Arsenal, Col. D. M. King, Commanding, on the strength of wall speciments laid up in lime mortar. These tests, which were made by P. C. Cunnick, Director of the Laboratories there, were conducted at the ages of 1, 2, 3, 4, 5, 6, 7 and 28 days on specimens 8 inches thick, 16 inches long (4 headers) and 36 inches high (13 courses), and supplementary tests were also made on 2 and 3 brick specimens. The data secured is most interesting. All specimens were laid up with ⅜ mortar joints, all joints full, by the Arsenal bricklayers under the immediate supervision of the foreman, Mr. Foley, and represent good average practice. Clay brick, classed as "hard" under the A. S. T. M. requirements, were used throughout. Three types of 1:3 mortar were used.

In one group of tests the mortar was made from hydrated lime and sand mixed just before use, as might frequently be the case in the field. The other two mortars were made from lime putty and sand, the difference being that in one group the putty had been allowed to age for 3 days and in the other the ageing period was 14 days. All materials were obtained on the open market.

In order to determine how much settlement would occur under loads at these early ages a series of readings were taken on each specimen, the measurements being taken to 1/1000 of an inch and the loads which produced these deflections noted. The results are shown in Table I.

It will be seen that even at the age of 1 day it would require far greater loads than could be imposed on a wall to produce a settlement which could be noted. For quick computations, it is safe to say that each foot of wall produces a load of one pound per square inch. For example, to compress an 8 inch wall one foot high and one day old 1/64 inch would require the erection of 30 feet of wall during the next day. If the wall at the end of a day's work was 5 feet high, it would require 6 feet more wall laid up during the next day to produce a settlement of 1/64 inch or 12 feet more to show 1/32 inch settlement.

These figures are of more theoretical than practical interest, for a grain of sand passing a 50 mesh screen is big enough to more than compensate for such a settlement and the ordinary mason's trowel is a full sixteenth of an inch thick. It would, therefore, be impossible to measure wall settlement on a regular piece of masonry construction, even when the walls are being rushed up. Considerably greater loads would be required to produce settlement in the wall if the loading was delayed even another day or two.

Inasmuch as factors other than pure compression enter into wall

*From an address presented before the Building Officials Conference on April 26, 1926, at Columbus, Ohio.

TABLE I

Loads Producing Given Deformations
8x16x36 inch Wallettes
1:3 Lime Mortar

Mortar made from	Deformations of wall per ft. of height	Average Load in Lbs. per Sq. Inch on Wallettes at Test 1	2	3	4	5	6	7	28
Hydrated	1/64"	33	30	40	40	50	40	55	105
Lime	1/32"	75	60	75	75	90	80	98	180
Not Aged	1/16"	182	145	180	180	210	185	225	367
Lime Putty	1/64"	38	..	..	..	..	..	50	92
Aged	1/32"	72	..	..	..	..	..	97	172
14 Days	1/16"	167	..	..	..	..	..	210	345
Lime Putty	1/64"	25	25	25	30	30	30	37	92
Aged	1/32"	47	50	45	55	50	50	67	172
8 Days	1/16"	105	110	95	110	130	105	145	335

Loads recorded under 1, 7 and 28 days, 6 specimens; 2, 3, 4, 5, 6 are 3 specimens.

strength, tests of the shear strength of specimens laid up in these several mortars were also made. The specimens consisted of three bricks bonded together with two ordinary mortar joints. They were tested in the vertical position with the two outer brick supported on knife edges 3½ inches apart and the load applied to the center brick through a spherical bearing block as specified by the A. S. T. M.

In these tests, as in the compression tests, the strength of the specimen increased with age, but even at the very early ages sufficient strength is developed to resist all ordinary forces. For example, at one day a single brick surrounded by mortar on 2 sides and 2 ends would have a resistance to displacement of 250 lbs. if laid in mortar made from hydrated lime; while at 28 days it would require a uniform pressure of 72.8 lbs. per sq. in. on the exposed face of a standard brick in a 4 inch wall to force it loose.

Table II shows that at the age of one month these "wallettes" have a compressive resistance of nearly 800 lbs. per square inch. Some time ago the U. S. Bureau of Standards ran a series of compressive strength tests on sand-lime brick walls, using both large sized specimens and "wallettes." These tests are reported in Technologic Paper 276, "Compressive Strength of Sand-Lime Brick Walls." The investigators found that the strength of the large specimens was from 60 to 80 per cent of that of the small specimens or "wallettes."

TABLE II
28 Day Strength of Wallettes

1:3 Mor. made from	*Average Maximum load lbs.	*Average Max. Strens. lbs. per sq. in.
Hydrate, not aged.....102,000		793
Lime putty, aged 14 days. 103,250		778
Lime putty, aged 3 days. 65,750		514

*Average based on results from 6 specimens.

On this basis it will be seen that the factor of safety of masonry laid up in lime mortar is high. Under ordinary conditions the U. S. Building Code Committee in their report on Minimum Requirements for Masonry Wall Construction, permits a loading of 90 lbs. per sq. in. when 1:3 lime mortar is used. Assuming that the loading equals this figure, which actually is rarely reached, the factors of safety as calculated from the 28 day results here presented may be taken as 6 when 14 day putty or hydrate is used, or 4 when the putty has been aged only 3 days.

Not only is the factor of safety sufficient when using code limits for design, but when the actual load is computed it will usually be found far below the code limit, thus raising the factor of safety several times. For example, take an ordinary city row house with a party wall. Ordinarily the live load will be 40 lbs. per square foot for floors and roof, with a dead load of 60 lbs. per square foot. The unsupported loaded span may be considered as being 20 feet. The brickwork may be figured as weighing 120 lbs. per cubic foot. Using these figures it will be seen that the masonry stresses in an ordinary 3 story structure are well within the limit of 90 lbs. per sq. in. When stresses are computed, however, the U. S. Code Committee permits an increase of 50 per cent, raising the load on lime mortar to 135 lbs. per sq. in. Under that limit, structures of the type just referred to could be carried up to 10 stories before the limit is reached. However, the wall space required would govern before the load limit was reached and steel or concrete frame construction would be used.

Lime mortar has been used for centuries in all types of masonry work and its durability has been established by the test of time. Its fire resistance has been tested and found satisfactory, its strength is more than sufficient for all ordinary wall loads, and its economy is apparent.

Where high and concentrated loads are encountered cement may be added

LOADING ON PARTY WALL, 20-FOOT SPAN BOTH SIDES

Height Stories Plus Roof	Feet	Wall Thickness Inches	Weight of Wall per Linear Foot	Live and Dead Load per Ft.	Total Load per Linear Foot	Load on Lowest Mortar Bed, Lbs. per Sq. In.
1	10	8	800	4,000	4,800	50
2	20	8	1,600	6,000	7,600	80
3	30	12	2,800	8,000	10,800	75
4	40	12	4,000	10,000	14,000	97
5	50	16	5,600	12,000	17,600	92
6	60	16	7,200	14,000	21,200	110
7	70	20	9,200	16,000	25,200	105
8	80	20	11,200	18,000	29,200	122
9	90	24	13,600	20,000	33,600	117
10	100	24	16,000	22,000	38,000	132

to lime mortar. Such a practice will increase the strength of the mortar, although it also increases both the labor and material costs. These factors should all be taken into consideration when specifying types of mortar.

A series of tests to determine the effect of low temperatures on various types of mortars was recently reported by the University of Wisconsin. They found that a mix composed of 1 part cement, 2 parts lime and 9 parts sand by volume combined the three desirable functions of ample strength, resistance to damage by low temperatures, and economy. This mortar is easy working and easy to proportion, both of which are important on the job.

Mortar should be used just as steel, concrete, wood, or other structural materials are used. In other words, it should be specified with due regard to the load which it must carry. There is no more reason to require a built up steel girder as a door lintel in a bungalow than there is to specify a rich cement mortar in one-story building or in a curtain wall, for in both cases strength would be wasted and economy sacrificed.

New Spreading Device for Screen

A new arrangement of a receiving hopper has just been announced by Link-Belt Company as standard equipment for its vibrating screens.

This hopper has been found to be an excellent means of distributing materials quickly over the entire width of the screen cloth area, and a distinct help to better screening of the applicable materials.

The new automatic feeding device, combined with the vibration of the hopper along with the screen, gives a rapid and uniform spread of the material, which takes advantage of every square foot of screening area; and thus adds about two feet to the effective screening length, without increasing the length of the machine.

It would seem that the use of this spreading device should be greatly instrumental in eliminating rapid wear of the screen cloth at the receiving surface, permitting, in addition, the stratification of the particles at a higher rate of speed. A swinging feed plate, with counterweighted adjustment automatically regulates the feed.

This feed plate also spreads the material uniformly across the width of the screen cloth, enabling a non-uniform load, discharged fairly close to the center of the receiving hopper, to be spread evenly over the screen cloth at the proper rate of speed.

New Crane Catalog

A new catalog has been issued describing the construction of Ohio Locomotive Cranes in detail. The company offers the operator a wide variety of types, ranging from 10 to 50 tons in capacity, operated by steam, electricity, compressed air or oil engines.

The cranes are made in a completely equipped factory by skilled mechanics operating under the direction of a highly trained corps of engineers. The manufacturers claim that due to the construction of their cranes, breakage is almost unheard of; thus insuring the customer the three essential characteristics of a locomotive crane, speed, economy and durability.

The catalog is profusely illustrated and the pictures give the prospective purchaser graphic representations of all the essential parts from several angles. The main rotating base of the turntable is one large steel casting. To the sides and rear of this the structural steel frame is riveted.

Hudson River Equipment Corp. (Building materials.) 100 shares common stock, no par. L. S. Hazzard, O. C. Jaeger, J. S. Collins. New York City.

Huntington Gravel and Supply Co., Huntington, W. Va. Capital $100,000. Incorporators: L. L. Wilson, George L. Neal, Lena Davis, Frank P. Slack and Nellie Dempskey.

E. M. Harding & Co., Newark, N. J. (Building materals.) Capital $100,000. Incorporators: Ethel Botwinick, Belle Mornitzky, Corinne Jekel, Murray Shapiro.

Genesee Builders Supply Corporation, Rochester, N. Y. Capital $50,000. Directors: Louis D'Argento, Frank D'Argento, James DePalma, Peter Colella and John DiLaura.

A Compact Dredging Plant

Building construction and secondary road work in North Central New York have created a wide demand for a good grade of clean sand and gravel. The demand in this section of the state has been filled by many firms operating in the lakes and rivers of the section, as well as a goodly number of dry pit operators. Eldridge and Robinson of Auburn, New York, belong to the former class.

Their dredge operation, which was designed by Jean M. Allen, is noteworthy because of its compactness. The whole plant is on the dredge, which is held firmly in whatever position is selected by cables and anchors from each quarter. The power plant is housed in the stern of the barge. Steam is used for most of the power, but a 30 h. p. gasoline engine operates the crusher.

In the fore part of the barge is a huge A frame, pivoted at the bottom. The hoisting is done over this A frame which is always in a forward position. The frame is guyed fore and aft with heavy springs and cables to take up any shock and the material is lifted from the water by a three-yard clam shell bucket attached to a Flory hoist. When the bucket gets high enough to pass the receiving hopper the A frame is pulled back twelve feet by another Flory hoist operated by steam power and the bucket is then in position to dump directly into the mouth.

A grizzly in the hopper throws the over-sized material into a crusher. Passing from the crusher, the reduced material joins the smaller sizes in the boot pit of a Weller bucket elevator and is carried to the Weller screen, located about 35 feet above the water line. In the screen a six-inch stream of water is pumped into the material, giving it a thorough cleansing. The water drops with the sand into an Allen sand cone and the water is drained off.

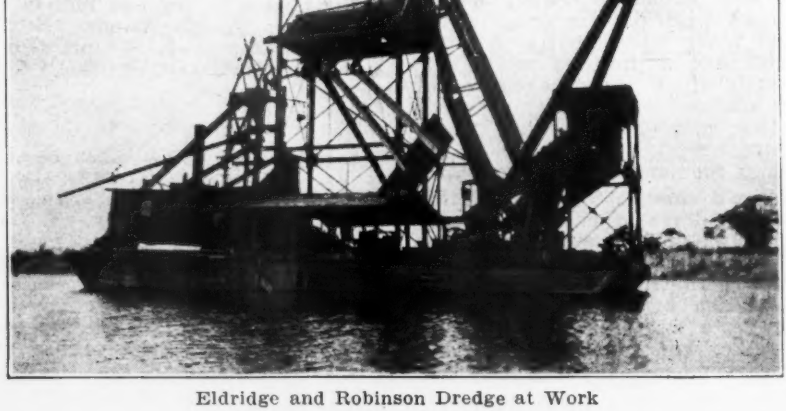
Employing the gravity gained by the high elevation of the material, the finished product is chuted into barges and hauled ashore, where it is trucked to its destination. The plant has a capacity of 500 yards a day.

New G. E. Booklet

"Power Factor and Means for Its Improvement" is the title of a 33-page illustrated booklet issued by the General Electric Company, Schenectady, New York. The publication contains authoritative information on means for power factor improvement in industrial plants. It presents clearly and systematically the treatise on power factor and reduces the mathematics to simple arithmetic.

Mr. Francis A. Emmons, for the past two years Advertising Manager of Foote Bros. Gear & Machine Company of Chicago, has recently been appointed sales manager.

Ponca City Rock and Sand Company, Ponca City, Okla. Capital increased from $10,000 to $100,000.



Eldridge and Robinson Dredge at Work

International Organization for Standardization

The basis of a general international organization for industrial standardization was laid at the Third International Conference on Standardization, which has just completed its work in New York City, by unanimous agreement upon the draft of a constitution for the new international body. At this conference the national standardizing bodies in eighteen countries were officially represented, Hungary and Australia alone being without delegates.

The proposed constitution of the new organization, which is to be called the "International Standards Association," states the aims and objects of the association as follows:

"To lay the groundwork for international agreement upon standards by providing simple systematic means of interchanging information on the standardization work and activities in the different countries.

"To develop general guiding principles for the assistance of the national standardizing bodies.

"To promote uniformity among the standards of the various national bodies.

"It is the intention of the International Standards Association that its work shall include the approval of international standards and the administrative machinery herein set up is so designed that it may be readily extended or modified to include the approval of such international standards when sufficient experience has been acquired."

The members of the International Standards Association are to be the central national standardizing bodies existing in the different countries, one for each country, accepting this constitution.

The chief executive body is to be the "Plenary Assembly," composed of delegates of all the national bodies, with the final authority resting with the latter. Provision is also made for an "Administrative Council," with control of finances and administrative matters, but with advisory powers in important questions.

The conference recommended that the seat of the new organization be in London, final decision to be made by the first Plenary Assembly.

Work on technical questions will be in the hands of "technical committees," with official representation from each country interested.

The financial support is to be divided into three parts; 25 per cent of the total budget as a fixed sum to be divided equally among the national bodies; 50 per cent of the total budget based on the total annual foreign trade of each country; 25 per cent of the total budget based on the population of each country.

The conference appointed a committee of seven to formally submit the proposed constitution to the twenty national standardizing bodies, and to arrange for a Plenary Conference for final ratification and organization. The countries represented on the committee are: Belgium, Czechoslovakia, Germany, Great Britain, Sweden, Switzerland, and the United States.

During the sessions of the conference, informal negotiations were opened with the International Electrotechnical Commission (an important international body now functioning in the specialized field of electrical engineering) in regard to a unified organization, and the committee of seven will undertake to secure joint action in the final organization which it is expected will be consummated when the Plenary Assembly is held.

In connection with the main conference, informal conferences between technical experts were held on the subjects of screw threads, bolts and nuts, limits for fits, preferred numbers, and ball bearings.

The conference was called by the American Engineering Standards Committee, and was presided over by its Chairman, Mr. C. E. Skinner.

Nearly all of the delegates to the conference are accompanying the members of the International Electrotechnical Commission, as guests of the American section of the latter, on a tour of inspection by special train which will visit Philadelphia, Washington, Pittsburgh, Chicago, Detroit, Windsor, Niagara Falls, Ottawa, Montreal, Boston and Schenectady, returning to New York May 5.

The Robert June Engineering Management Organization of Detroit has moved to larger quarters at 2208 West Grand boulevard where it now occupies the entire building. This is the organization's fourth move in four years to larger quarters. The new building gives the organization greatly added facilities to serve its clients.

Sandles for Governor

For nearly ten years A. P. Sandles earnestly and honestly helped build the crushed stone industry to what it is today in his work with the National Crushed Stone Association and the Ohio Crushed Stone Association as secretary. While Mr. Sandles resigned as national secretary for the National Crushed Stone Association late last year because of the removal of the association headquarters to Washington, his resignation as secretary for the Ohio Crushed Stone Association became effective on April 15, 1926.

Mr. Sandles resigned in the recent instance to seek nomination for Governor of Ohio at the coming state primary on August 10. Mr. Claude Clark, who has been associated with Mr. Sandles in his work in the crushed stone industry, has also resigned to assist Mr. Sandles in his primary campaign.

A. P. Sandles

While it is to be regretted that "Put" Sandles is leaving active affiliation with the crushed stone industry, it should be remembered that he is entering a field of much broader service. His record of achivement in association building will long be remembered, and the crushed stone industry may be proud to know that some of the ideas and principles of a governor were formulated in rendering an unselfish service to an industry today which is of vital concern to the nation. The crushed stone industry owes Mr. Sandles a debt of gratitude and earnestly wishes him success.

Accident Rate Declines

What accident prevention experts believe is a record in the reduction of industrial accidents was announced by William M. Kinney, general manager of the Portland Cement Association. Since 1920 the safety first activities carried on by his organization, Mr. Kinney says, have reduced the number of accidents in portland cement plants 45.2 per cent, the number of days lost due to injuries 40 per cent, and the number of fatalities 33.3 per cent.

"These records," explained Mr. Kinney, "apply to the whole industry, which employs more than 40,000 workers. Individual plants far exceeded these figures. Plant number 8 of the Canada Cement Company at Port Colburne, Ontario, and the Duluth, Minnesota, plant of the Universal Portland Cement Company, each ran practically a year and a half without a single lost-time accident. Two men from each of these plants will be sent to the spring meeting of our association in New York City to receive the Portland Cement Association's safety trophy.

"When our members began this safety work thirteen years ago they found to their surprise that the responsibility for accidents lay about 25 per cent with the manufacturers, and about 75 per cent with the men themselves. In many plants, our investigators learned, the machinery itself was dangerous. But the men themselves, either through ignorance or recklessness, were far more dangerous. They took chances constantly that were contrary to ordinary reason.

"We quickly induced our members to protect their machinery, and then we began an intensive campaign among the workers. The cement makers undertook all this work with the idea that they were simply spending money for their employes, but they quickly found that it paid them in actual dollars and cents, through improvement of their manufacturing personnel, reduction in delays and saving in accident compensation. Hence they have continued it enthusiastically."

Thaleg and Hock, distributors for the Tractocrane and manganese, alloy steel castings and forgings, have opened an office at 236 North Clark street, Chicago. O. E. Thaleg and J. H. Hock compose the firm.

Winners of the National Safety Competition

EXTRAORDINARY records of large industrial production with no loss of time occasioned by accidents were revealed in connection with the announcement made by Secretary Hoover of the Department of Commerce, of the names of mines and quarries adjudged winners of the national safety competition held under the auspices of the Bureau of Mines, for the bronze trophy "Sentinels of Safety," donated by the Explosives Engineer magazine. A Maryland quarry operated 350 days and worked 202,663 man hours during 1925 with no loss of time from accidents. Four other quarries, located in Indiana, Tennessee, New York and California, also operated with no loss of time due to personal injuries. In addressing congratulatory letters to the winners, Secretary Hoover visualized the great economic benefits, both to producers and consumers of coal, ore and stone, from this nation-wide effort to prevent accidents, in which during its first year more companies and individuals had participated than in any other organized safety contest.

Nearly 300 of the larger mines and quarries participated in the competition, the contestants being divided into five groups: anthracite mines, bituminous coal mines, metal mines, mines producing non-metallic minerals, and quarries or open pit mines. A replica of the trophy is awarded to the mining operation in each group sustaining the smallest loss of time from accidents in proportion to total time worked during the year. Determination of the winners was made by a jury of award comprised of officials of various mining and quarrying associations, the National Safety Council, and the American Federation of Labor, based on a tabulation of mine accident data prepared by the Bureau of Mines. A feature of the competition is the awarding of a certificate of honor, signed by the director of the Bureau of Mines, to every employee of each of the winning mines and quarries for their share in the low accident records made by their companies.

The winner in the anthracite group is the Upper Lehigh mine, Upper Lehigh, Pa., operated by the Hazle Brook Coal Company. In this group, honorable mention was accorded the Midvalley mine, Wilburton, Pa., operated by the same company.

The winner in the bituminous coal mining group is No. 6 mine of the United States Coal and Coke Company at Gary, W. Va. Honorable mention was given the No. 3 mine of the same company, also located at Gary; and the Rossiter No. 4 and 5 mine, at Rossiter, Pa., operated by the Clearfield Bituminous Coal Corporation.

In the underground metal mining group, the New York zinc and lead mine of the New York Mining Company, at Picher, Oklahoma, was adjudged the winner. Honorable mention was accorded the Beaver lead and zinc mine of the Commerce Mining and Royalty Company, at Carden, Oklahoma; the Velton zinc ore mine of the Eagle-Picher Lead Company, Bricefield, Mo.; the lead mine of the St. Louis smelting and refining works of the National Lead Company, at St. Francis, Mo.; and the Goodwin lead and zinc mine of the Eagle-Picher Lead Company at Picher, Okla.

In the group of underground mines producing non-metallic minerals, the trophy was awarded to the Lower gypsum mine of the United States Gypsum Company, at Gypsum, Ohio. Honorable mention was accorded the Ironton under-ground limestone quarry, operated by the Alpha Portland Cement Company, Ironton, Ohio; the Crystal City sand mine of the Pittsburgh Plate Glass Company, at Crystal City, Mo.; the limestone underground quarry of the Alpha Portland Cement Company, at Milltown, Indiana; and the Bell underground high calcium limestone quarry of the American Lime and Stone Company, at Bellefonte, Pa.

In the quarry and open pit mine group, the winner is the Security quarry of the North American Cement Corporation, at Security, Md. Honorable mention was accorded the cement rock quarry of the Louisville Cement Company, at Speed, Ind.; the limestone quarry of the Dixie Portland Cement Company, at Richard City, Tenn.; the Cementon quarry of the Alpha Portland Cement Company, at Cementon, New York; and the andesite quarry operated by the City of Los Angeles Harbor Department on Catalina Island, Calif.

Companies operating a coal mine employing 50 or more men underground, a metal or other mine employing 50 or more men underground, or a quarry or open pit mine employing

25 or more men in the pit were eligible to compete for the trophies. The trophy, which is the work of Begni del Piatta, designer of the Navy and Marine Memorial to be erected in Washington, portrays in bronze a mother and child greeting the father upon his safe return from work. The names of the mines and quarries who win the right to hold the trophy for a year will be engraved on the pedestal. On the remaining sides of the pedestal are panels emblematic of coal mining, metal mining, and quarrying and open-pit mining. The trophies will be bestowed upon the winning companies at the International First-Aid Meet, to be given under the auspices of the Bureau of Mines at San Francisco, Calif., early in September.

Members of the jury of award were as follows:

H. Foster Bain, secretary, American Institute of Mining and Metallurgical Engineers, New York.

James F. Callbreath, secretary, American Mining Congress, Washington, D. C.

W. H. Cameron, managing director, National Safety Council, Chicago, Ill.

H. L. Gandy, secretary, National Coal Association, Washington, D. C.

A. T. Goldback, director, engineering bureau, National Crushed Stone Association, Washington, D. C.

William Green, president, American Federation of Labor, Washington, D. C.

H. G. Jacobsen, manager, bureau of accident prevention and insurance, Portland Cement Association, Chicago, Ill.

The following congratulatory letter was addressed by Secretary Hoover to the winner in each group:

April 27, 1926.

I wish to extend my congratulations on the success of your effort in the prevention of accidents during the year 1925, which enabled you to win the "Sentinels of Safety" trophy awarded to the leaders in the national safety competition held under the auspices of the Bureau of Mines.

The American working man leads the world in individual productivity, but our expenditure of human life through industrial accidents has robbed us of much of the net advantage of our efficiency in production. Since there are more than 200,000 accidents in the mining and quarrying industries annually, it is easy to foresee great economic benefits from this nation-wide movement, in which during its first year more companies and individuals have participated than in any other organized safety contest.

Realizing that the advancement of safety in mining and quarrying depends upon the men who actually produce our coal, ore and stone, one of the principal objects of this national safety competition has been to enlist the cooperation of every worker. In appreciation of the value of this cooperation each person employed by your company during 1925 will receive a certificate of honor signed by the Director of the Bureau of Mines.

New Incorporations

Chester Builders' Supply Co., Chester, Pa. Incorporator: George V. Wagner.

Exner Sand and Gravel Corp., New York City. Capital $30,000. P. J. & H. E. Exner, D. Luedeke, incorporators. (Atty., L. E. Felix, 217 B'way.)

Schumacher Corp., Wilmington, Del. (Operate fiypsum mines and other mines.) Capital $5,000,000. (Corporation Trust Co. of America.)

McHugh Sand & Gravel Company, Inc., Brooklyn, N. Y. Capital $1,000. Directors, M. A. Plunkett, S. Nicholson, L. Jancer, Brooklyn, N. Y.

National Asphalt Products Corp., Danville, Ill. Capital $75,000. Incorporators: Arvid Erickson, B. E. Earle, George Olmstead.

Builders Supply Company, Trenton, N. J., (building materials). Capital 25,000 shares, no par. Incorporators: Jacob Teich, Rebecca Teich, Mary M. Wilson.

Manten Corporation (building materials). Capital $5,000. Incorporators: C. S. Salomon, L. Teplitsky, L. Moses. (Atty., N. E. Vernon, 1440 Broadway) New York City.

Consumers Sand Co., Kansas City, Mo. Capital increased from $100,000 to $2,500,000.

H. C. Osman, sales manager of the Nugent Steel Casting Company, Chicago, has been elected secretary of the company. He will continue to have charge of the sales of the company. C. A. MacDonald, formerly secretary has been elected treasurer.

A New Gypsum Business

In keeping with the rapid increase of gypsum which new uses and extra building programs bring about, the Mammoth Plaster and Cement Company with headquarters at Cedar City, in the southwest part of Utah, has been organized for the purpose of manufacturing gypsum materials.

The property of this company is located at Cedar City, Utah, near the branch line of the Union Pacific railroad built into this mineral, livestock, and scenic section during 1923. The coming of the railroad made possible the development of the vast gypsum deposits which are unexcelled in amount, quality, and accessibility.

The folds of this deposit are projected high above the surrounding country making open quarrying and gravity operation possible. There is hardly a limit to the amount of the deposit. The quality is shown in this company's having fulfilled a contract during 1924 calling for 30,000 tons of the raw crushed gypsum with a minimum purity of 97 per cent. This material was shipped to Los Angeles and was used mostly in making molding and casting plaster and other high grade products. The average of many laboratory tests that have been made is about 98 per cent total purity and 46.7 per cent sulfur trioxide. This extra amount of SO_3 makes the sand-carrying capacity or the spread of the plaster very high. The deposit is comparatively free from overburden.

Now that the railroad has tapped this store of natural wealth, market conditions are favorable. The distance to Salt Lake City is about 250 miles while it is about 500 miles to Los Angeles. Freight rates, and the accessibility of the gypsum as well as cheap power and fuel place this new business on a strong competitive basis.

It is the hope of the Mammoth Plaster and Cement Company to erect a plant that will produce a variety of gypsum materials such as the wall plaster, wall board, blocks, etc. So far they have produced only the raw crushed gypsum.

Production of Pyrites Increase in 1925

The production of pyrites in the United States in 1925 amounted to 170,081 long tons, valued at $650,448, according to figures compiled by the Bureau of Mines, Department of Commerce. This is an increase of 6 per cent in quantity, but only 1 per cent in value, as compared with the 1924 output, which was 160,096 long tons, valued at $645,262. The quantity of pyrites sold and consumed by producing companies also increased 6 per cent, or from 160,075 long tons in 1924 to 170,298 long tons in 1925. In 1925, as in 1924, the pyrites production was made in California, New York, Ohio, Virginia and Wisconsin. The combined production of California and Virginia was 163,773 tons, 96 per cent of the total for the country.

The imports of pyrites in 1925 amounted to 276,385 long tons, valued at $773,925, compared with 246,737 long tons in 1924, according to the Bureau of Foreign and Domestic Commerce. Nearly all of the imports came from Spain, with small amounts from Canada.

Gypsum Properties of the Mammoth Plaster and Cement Company

New Brookville Fordson Locomotive

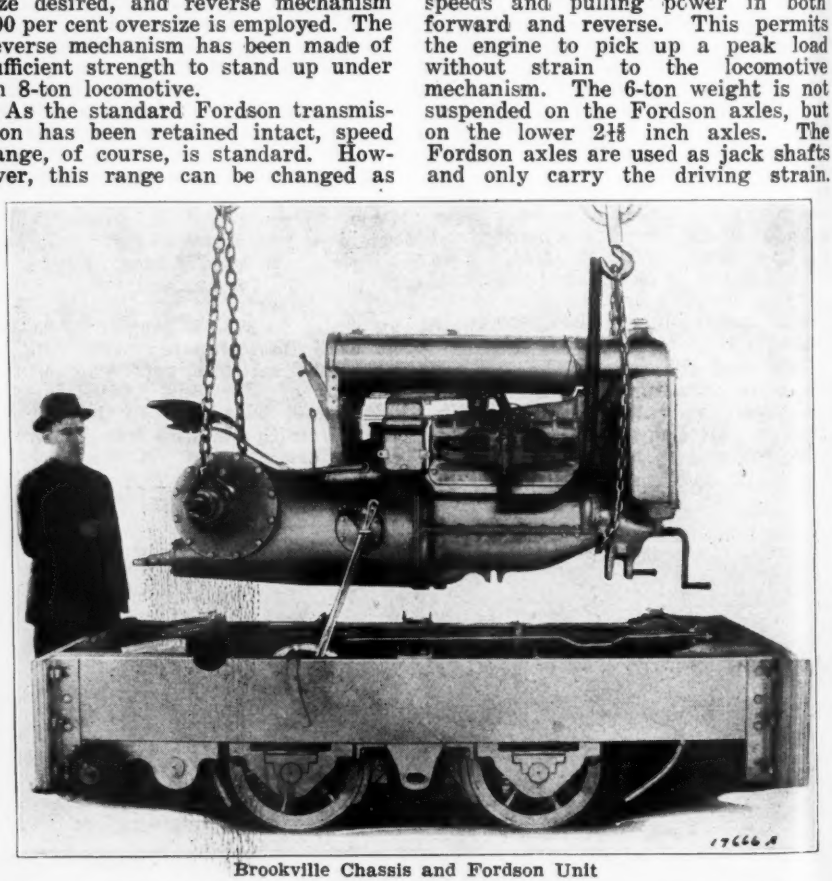
The Brookville Truck and Tractor Company, manufacturers of Ford driven locomotives since 1918 are now under full production on Fordson driven types, equipped with three forward and three reverse speeds; with equal pulling power in both forward and reverse work. They have been striving for reverse mechanism for the Fordson since 1919, but have always refused to employ reverse features that necessitated the replacement of Fordson mechanism. The Fordson differential case is too small to permit the use of gears, shafts, etc. of sufficient size to stand up under heavy duty service. The Brookville Reverse is a part of the Brookville locomotive chasis, and entirely independent of the Fordson mechanism. This gives space for reverse parts of size desired, and reverse mechanism 100 per cent oversize is employed. The reverse mechanism has been made of sufficient strength to stand up under an 8-ton locomotive.

As the standard Fordson transmission has been retained intact, speed range, of course, is standard. However, this range can be changed as desired through the use of different ratio sprockets on Fordson axle shafts.

Reverse mechanism of proper strength has allowed for the addition of numerous models, covering 5 and 6 tons weight. The 4 ton, 5 ton and 6 ton models all carry the reverse. The older model 3½ ton without reverse has been retained.

The 4 and 5 ton models with reverse, in the narrow gauges, as now offered are equal in every way, covering efficiency, design, workmanship and material to the highest priced gas locomotives manufactured.

The 6 ton standard gauge with MCB couplings for handling standard freight cars has been geared extremely low, with approximate speeds of low, one mile; intermediate, two miles; high, six miles, with the same speeds and pulling power in both forward and reverse. This permits the engine to pick up a peak load without strain to the locomotive mechanism. The 6-ton weight is not suspended on the Fordson axles, but on the lower $2\frac{15}{16}$ inch axles. The Fordson axles are used as jack shafts and only carry the driving strain.



Brookville Chassis and Fordson Unit

Name and Address of Manufacturers of Equipment Mentioned May be Obtained from Publishers

Barber-Greene Bucket Loader

Specifications for the new Barber-Greene bucket loader, known as model 25, indicate that it is built for durability and heavy work. The new model weighs 9,500 pounds and can be had with either gasoline or electric power and with either a swivel spout or a 14 cubic foot hopper. If a hopper is chosen it can be supplied in either the strike off or the standard overflow type.

The main frame of the new machine is built up of structural angles, channels and plates riveted together making it strong and rigid. The driving machinery is completely housed from dirt and the housing has removable cover plates for accessibility. The crawlers are self-cleaning links 10 inches wide, with three-point suspension chilled rollers, and cast iron sprockets. The crawler frames are made of structural steel using 7-inch channels and the plates are riveted and welded, making them very rigid and strong and providing a take up for the crawler drive chain similar to that used on the 42-A loader, i. e., by means of filler blocks inserted in steel pockets. The bearings for the driving axle are cast steel babbitted and riveted rigidly to the crawler frame preventing any misalignment of the shaft.

Each crawler is driven independenly through a train of gears and chains taking power from the main jack shaft through 6-inch compression type of external band clutches. A Warner auto-truck transmission is used with the machines driven by a gasoline engine, and a midship-type auto-truck transmission with electric motor drive. These are made by specialists in transmission building. Borg and Beck master clutch type 10QL is used between the transmission and the engine. The speeds are as follows: Low 30 feet per minute; second, 60 feet per minute; high, 100 feet per minute and reverse, out of the material, 26.5 feet per minute. These vary slightly with electric motor on account of the different ratios in the transmission.

Either a General Electric motor 10 h.p. with revolutions per minute available current or a Continental Red Seal gasoline power unit is furnished. The Continental Power Unit is P-20, a 4-cylinder 3⅜ inch bore, 4¼ inch stroke, rated 20 brake horse power at 1,200 r.p.m. Speed is controlled through a Pierce governor. Lubrication is by means of combined force feed and splash system. The best known engine accessories are used, such as Zenith carburetor, Eisman high tension magneto with impulse starter, Perfection air-cleaner, and tractor-type radiator. The engine and parts are enclosed in a steel housing, weather proof with

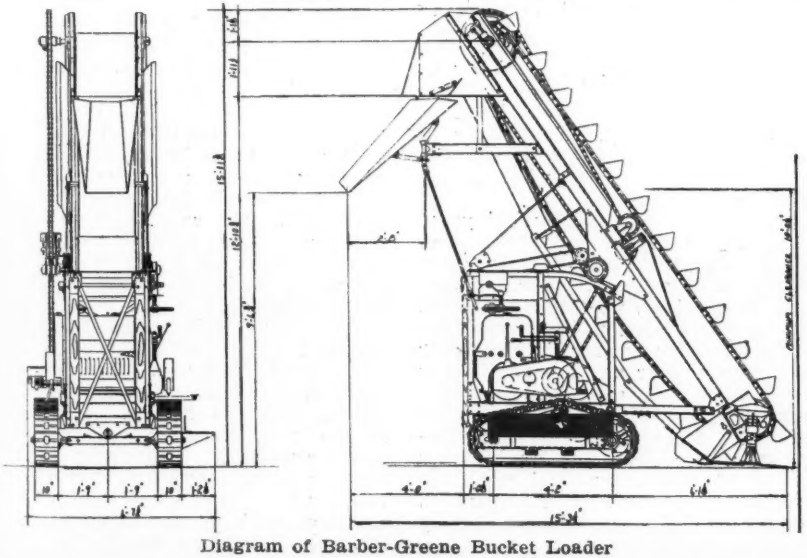


Diagram of Barber-Greene Bucket Loader

Name and Address of Manufacturers of Equipment Mentioned May be Obtained from Publishers

ventilating removable side panels. Alemite high-pressure lubricating syswith industrial fittings is used throughout.

The buckets are 18x8 inches made of malleable iron spaced on 18-inch centers on two strands of number 742 chain, running on the same size chilled head and foot sprockets as used on the 42-A loader.

A 30-inch patented revolving disc feed and scraper similar to that used on the 42-A loader is provided for the initial setting. The disc drive consists of steel bevel gears 2 to 1 ratio, entirely enclosed in a cast steel housing, completely protecting them from dust and dirt.

The boom is mounted on a curved track similar to the 42-A loader. Power is transmitted from the main jack shaft through a single strand of Rex A-508 steel bushed roller chain to a safety sprocket with breaking bolt on the head shaft. The head shaft is 14 feet, 8⅜ inches from the ground approximately the same height as the 42-A loader.

The rated capacity is one cubic yard per minute in free flowing material. The swivel spout of the 42-A loader design is furnished.

G. F. Daggett Succeeds Wilson

G. F. Daggett, formerly materials engineer of the Wisconsin Highway Commission, has been appointed executive secretary of the Wisconsin Mineral Aggregate Association. Mr. Daggett succeeds N. K. Wilson who resigned recently to become general sales manager of the Waukesha Lime and Stone Company. The offices of the Wisconsin Mineral Aggregate Association are at 6098 Plankinton Building, Milwaukee.

Mr. Daggett has had several years of experience in general engineering and highway work and is well known throughout the state. For thirteen years he has been with the Wisconsin Highway Commission in various capacities, serving as materials engineer for the past year and a half. He is a graduate civil engineer from the University of Wisconsin, a member of the American Society of Civil Engineers, a member of the Engineering Society of Wisconsin, and with his wide acquaintance among engineers, contractors and material men, is ably qualified for this position.

National Slag Association Elects

The National Slag Association held its ninth annual meeting in the Old Colony Club in Cleveland on April 9th. Every director was present. The honor guest was P. H. Bates of the U. S. Bureau of Standards.

During the annual business sessions the following officers were elected to succeed themselves for the coming year: President, C. L. McKenzie, Duquesne Slag Products; vice president, C. E. Ireland, Birmingham Slag Co.; secretary-treasurer, H. J. Love, 933 Leader-News Building, Cleveland, Ohio.

A New Welding Torch

Consistent with the demand for a small welding torch for work not requiring the usual standard torch, The Alexander Milburn Company has perfected a new welding torch. This is a sturdy, compact torch giving a high degree of efficiency and economy and is known as type J-Jr. The torch uses the same tips as are supplied with the standard larger torches and is adaptable to all classes of welding. It uses low and comparatively equal pressures of oxygen and acetylene.

Due to its light weight, it is untiring to operate continuously. The quality of its work has been highly satisfactory. Comparison of its use show savings in gas and a speeding up of the work.

The supermixing of the gases through a standardized system of multiple mixing assures a complete intermixing of the gases and a uniform flame. The seats of the tips are flat, with annular grooves coinciding with those in the head, the gas passages entering through the annular grooves or rings which separate the gases. The construction of these seating surfaces allow lateral expansion of torch head and tip without distortion and the seats are very easily refaced.

The J-Jr. torch is adapted to gas supplied either from generators or compressed in tanks. The torch is made of bronze forgings and specially drawn stainless tubing. It is very simple in construction, with all parts easily accessible. An angle of 67½ degrees in the head allows a natural position in operating the torch, utilizes the heat to best advantage and protects the operator's hand.

Sales of Limestone in Bedford-Bloomington District, Indiana, in 1925

The sales of limestone for construction by the quarrymen in the Bedford-Bloomington oolitic limestone district of Lawrence and Monroe Counties, Indiana, in 1925, amounted to 11,803,890 cubic feet, valued at $14,203,120, according to reports of producers to the Bureau of Mines, Department of Commerce. This is an increase of 7 per cent in quantity but less than 1 per cent in value. The quantity sold is greater than has ever before been reported, being slightly in excess of the sales for 1923.

The stone sold by the quarrymen in the form of rough blocks amounted to 5,168,780 cubic feet, valued at $3,109,746, an increase of 12 per cent in quantity and 9 per cent in value.

The dressed stone sold by quarry operators who also operate mills, was as follows: sawed stone, 4,431,660 cubic feet, valued at $4,529,272; semi-finished stone, 234,490 cubic feet, valued at $447,853; cut stone, 1,968,960 cubic feet, valued at $6,116,249.

Over 40 per cent of the rough blocks sold by the quarrymen is sold to mills in the district who mill the stone and re-sell it. Some of the quarry operators who also operate mills buy rough blocks, mill them, and sell the milled product. The sales of this dressed stone in 1925 amounted to 2,087,860 cubic feet, valued at $5,629,269, an increase of 19 per cent in quantity and of 21 per cent in value.

The sales of the different classes of this stone were as follows: sawed stone, 482,380 cubic feet, valued at $492,587; semifinished stone, 25,930 cubic feet, valued at $44,885; cut stone, $1,579,550 cubic feet, valued at $5,091,797. These figures represent increase in quantity and value for all classes of stone.

The accompanying tables show the sales of stone, by producers and by mills not operating quarries, according to the condition in which the stone was sold.

Ground Hog Arrives

This year the "Ground Hog" made its appearance late. In fact its initial appearance was two months after his justly famous "day." The "Ground-Hog" which appeared early in April was not the animal weather forecaster but a house organ published by the manufacturers of Marion power shovels. It derives its name from the work of these machines rather than from the beast which made February 2nd famous.

The first issue of the "Ground-Hog" states in its introduction that it is strictly an operators magazine and then goes on to prove it by publishing some interesting things about horse power and gasoline-electric machines. One of the features which will be welcomed by shovel and drag line operators is the practical helps department. This issue has some graphic information on kinking.

Sales of limestone for construction in the Bedford-Bloomington district, Lawrence and Monroe Counties, Ind., 1924 and 1925

Stone Sold by Quarry Operators

	Rough blocks		Sawed		Semifinished	
	Cubic feet	Value	Cubic feet	Value	Cubic feet	Value
Lawrence	2,886,780	$1,965,344	1,531,780	$1,582,560	33,530	$ 67,064
Monroe	2,282,000	1,144,402	2,899,880	2,946,712	200,960	380,789
Total, 1925	5,168,780	3,109,746	4,431,660	4,529,272	234,490	447,853
1924	4,594,970	2,864,217	3,929,760	3,982,847	244,740	553,039

	Cut		Total	
	Cubic feet	Value	Cubic feet	Value
Lawrence	1,619,450	$5,056,429	6,071,540	$8,671,397
Monroe	349,510	1,059,820	5,732,350	5,531,723
Total, 1925	1,968,960	6,116,249	11,803,890	$14,203,120
1924	2,236,100	6,764,138	11,005,570	14,164,241

Stone Sold by Mills Not Operating Quarries, 1924 and 1925[a]

Year	Sawed		Semifinished		Cut		Total	
	Cubic feet	Value	Cubic feet	Value	Cubic feet	Value	Cubic feet	Value
1924	358,260	$354,945	4,660	$12,144	1,391,580	$4,287,056	1,754,500	$4,654,145
1925	482,380	492,587	25,930	44,885	1,579,550	5,091,797	2,087,860	5,629,269

[a] Includes some stone purchased by quarry operators and milled and resold.

Rollway Bearing Changes

Several changes in the personnel of its sales force are announced by the Rollway Bearing Company, Inc., of Syracuse, New York. C. A. Call has been appointed sales manager; E. J. Lybery will take charge of the Detroit district; J. D. Firmin becomes engineering representative in the Philadelphia district; W. E. Smith goes to the Youngstown district to assist Samuel Farrell, district representative; and S. J. Kaiser remains in the Chicago territory as representative. Mr. Call was formerly assistant sales manager of the Gurney Ball Bearing Company.

Grease Tube Lubrication

Proper lubrication of motors was always a vexatious problem until it was greatly simplified through the advent of the ball-bearing motor with its inherent low bearing friction. Fairbanks, Morse & Co., of Chicago, were pioneers in developing the ball-bearing motor and they have demonstrated during the past fifteen years that by use of a suitable grease the lubrication of this motor is reduced to a 20-minute job once a year.

Now they have introduced another improvement that further simplifies motor lubrication. It is in furnishing the proper greases in collapsible tubes, each containing just enough grease for a motor's annual requirements. After flushing out the old grease with kerosene the new FMCO grease is squeezed from the grease tube directly into the bearing. The directions show just how much to put into each bearing for the best results. Four sizes of tubes are available for corresponding sizes of bearings.

There are many advantages in this tube method of greasing. The kind of grease best adapted for ball-bearing is used. It is of proper adhesiveness to cling to the balls; it maintains its consistency through all normal temperatures without being too stiff when starting in the cold, or melting and flowing out of the bearing when running at full load. It is free from gritty or corrosive constituents. No dirt or other deleterious matter is introduced into the bearing. The likelihood of using a stick or other random object of questionable cleanliness of taking grease from an open can to the bearing is entirely eliminated. The cap of the housing is not removed, only the plug. No grease is wasted or smeared outside of the housing and no wiping is needed. Just the right amount of grease required for the most perfect lubrication is used in each bearing.

Good Roads Chief Says Highway Improvements Will Continue

The annual improvement of more than 40,000 miles of highways in the United States as a result of combined efforts of federal, state and local agencies will continue during the next few years, in the opinion of Thomas H. MacDonald, chief of the United States Bureau of Public Roads. During the past several years the mileage of improvements on our highways has exceeded that figure. In speaking of the present initial objective of the road building industry in the United States, Mr. MacDonald stressed the need for the immediate improvement of all roads included in the federal-aid and state highway systems by widening, surfacing, and elimination of danger points.

"In this manner," he said, "we can promote the best interest of the nation at large, both in the matter of economy and the welfare of its industry. The increased traffic on our public highways has not only made their immediate improvement a matter of good policy for public convenience, but equally necessary to obtain the lowest possible cost of highway transportation."

New Report on Hydrology

"Contributions to the hydrology of the United States, 1925," just published by the Geological Survey of the Department of the Interior, is one of a series of annual reports that includes short papers on the water resources of different parts of the country. It contains a paper on water power and irrigation in the Madison River basin, Montana, a paper on the chemical character of the ground water of the northern Great Plains, a preliminary report on the geology and water resources of the Mud Lake Basin, Idaho, and an index of analyses of natural waters in the United States. All these papers have previously been published as separates but are now issued in a single volume, designated Water-Supply Paper 560. A copy can be obtained by writing to the Director of the Geological Survey, Washington, D. C.

Name and Address of Manufacturers of Equipment Mentioned May be Obtained from Publishers